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Notes and Comments

The Chemical Age Year Book, 1933

IT is always useful as well as interesting to consider present affairs in relation to the past, for by so doing we are admonished by our failures and inspired by our successes to go on to greater achievements. In next week's Annual Review Number of THE CHEMICAL AGE our readers will be provided with numerous opportunities for taking stock of the present position. In the meantime it is fitting to refer to another source from which the chemical industry can obtain an encouraging illustration of its progress in recent years. We refer to THE CHEMICAL AGE Year Book for 1933. The Year Book is now in the hands of most of our subscribers and advertisers and before the end of the year we hope to have completed the distribution of the remaining copies. Without laying ourselves open to the charge of immodesty or presumption we feel we can justly claim that this latest edition is not only worthy of its predecessors, but that it is better. At all events no pains have been spared to make it better in every way, and while all human efforts must necessarily fall short of the ideal we do feel that we have succeeded in producing a work of reference that is of real value to everyone in the industry. The new volume is the eleventh edition and not only is the cover changed in colour to a rich maroon but the arrangement of the contents has also been changed, so adding to the ease of access to any information that is wanted from the Year Book.

The particulars of chemical and allied organisations have been completely overhauled and rearranged, and readers are for the first time provided with a record of the year of formation and the present membership of each organisation—or, we should add, of each organisation that availed itself of the opportunity of disclosing these data, for quite a number of our inquiry forms came back without these items filled in. The number of bodies and local sections is now 163 against 137 in the 1932 edition, mainly owing to improved methods of gathering the information. Chemical officials in the different branches of national and local government are shown in a form that renders reference quick and easy, and the details of the services of the Department of Overseas Trade are brought up to date. The principal new feature of the 1933 Year Book is a bibliography for the chemical industry, comprising nearly a thousand works of reference, classified according to their usefulness to the various branches of chemical science and engineering. A list of the by-product coke oven plants in Great Britain is included for the first time, and other original features are the main provisions of the Patents and Designs Act, 1932, safety precautions in chemical works and a list of the chief chemical trade marks registered during the year. The index to commercial information and the list of new companies registered form a valuable work of reference, and the physico-chemical tables have been completely revised.

A Co-operative Effort

THE active co-operation of all firms represented in the Year Book enables the illustrated announcements to be made up into sections, so that within a few pages a reader has access to details of the representative firms in the industry making the type of product he wants. As most chemicals have to be manufactured before they can be sold and used, announcements of plant and equipment appear first, and then in logical order the reader is taken through the varied chemical products and the general "service" which complete the chemical industry. As an aid in getting right goods and the best goods, THE CHEMICAL AGE Year Book fills a want which is hardly satisfied in any other similar way. Always at hand, it will help an executive to make a wise choice when placing an order for goods. Its regular use enables the engineer and the chemist to economise in time often given to inquiry of possible makers and often of ourselves. The many firms whose advertisments appear have gone to much trouble to ensure that accurate description and illustration of their goods is given. We believe our readers will recognise this co-operative effort to help them in their daily work of satisfying a world of chemical and allied interests eager and ready to use their plant, materials and finished products.

Exhaust Fumes

FOR many years past the evils arising out of a smoke-polluted atmosphere have been clearly recognised not only by public health authorities but by the more enlightened members of the community. Even those persons whose sole source of instruction is the newspaper cannot plead ignorance of the ravages occasioned by the smoke clouds with which our cities and industrial areas are invested; for the daily Press loses no opportunity to stress their injurious effects or to make known the remedial measures which are advocated. Further valuable publicity is given to the problem by the National Smoke Abatement Society, whilst the gas industry, electricity authorities and low temperature carbonisation concerns are carrying the campaign into the very homes of innumerable citizens. In spite of all this publicity, in spite of researches and legislation, the smoke problem remains, and will

remain until the public at large not merely appreciates the benefits, both in health and wealth, which the community would enjoy by living in a smoke-ridden atmosphere but actually takes measures to prevent pollution.

To what extent atmospheric pollution is due to fumes produced in the operation of motor vehicles is a question upon which it would be idle to speculate; in any case these fumes, in industrial areas, such as those in the Midlands and the North, must form but a small percentage of the total. Nevertheless, in considering the problem their presence cannot be ignored. At the best they are disagreeable, whereas under less favourable conditions they may be a positive danger. Although one authority has stated that, in the open air, the concentration of the products of combustion is reduced one hundred-fold at one metre from the exhaust pipe, the conditions experienced in the congested streets of our cities, particularly during traffic blocks in London, are neither pleasant nor salubrious. Any means of effecting more complete combustion of the fuel should therefore receive the careful attention of every motor vehicle owner.

Remedying the Trouble in London

THAT some owners are fully alive to the situation and are sparing no efforts to remedy the trouble was demonstrated at a recent meeting of the North Western Section of the Institute of Fuel, when Mr. A. T. Wilford, chief chemist to the London General Omnibus co., submitted data which no heavy motor vehicle proprietor can afford to ignore; in fact, as was pointed out, the data provide a remarkable example of the manner in which the aims of the fuel economist and those of the public health idealist converge. It is common knowledge that the exhaust gases comprise a number of chemical compounds, among which carbon dioxide, carbon monoxide, saturated and unsaturated hydrocarbons, aldehydes, sulphur compounds, and lachrymatory substances have been indicated. Of these, carbon monoxide is certainly the most insidious and very probably the most toxic, hence every effort which tends to reduce the amount emitted into the atmosphere merits approbation and stimulation. That the amount can be reduced very considerably by substituting the compression ignition engine for the petrol engine is evident from the analytical data submitted by Mr. Wilford, a maximum of 0.2 per cent. having been found in the exhaust gases from service compression ignition engines.

On the other hand, it would, in our opinion, be futile to argue that such a conversion is unattended with any disadvantages, for it is well known that the sulphur content of the oil used in Diesel engines is relatively high, so high, in fact, that its emission at ground level may constitute a nuisance. Even so, the advantages rest largely with the compression ignition engine.

Cancer-Producing Substances

FROM the public health standpoint, however, a far more serious objection has been raised against oil-engined vehicles, for the exhaust fumes are said to contain appreciable quantities of cancer producing substances. Although this objection does not appear to be based on experimental evidence, the possibilities are so serious that the question demands immediate investigation. That most, if not all, the problems associated with exhaust fumes would be overcome by the use of coal gas in the spark ignition engine cannot be questioned. Unfortunately, certain factors, notably the bulk of the storage cylinders, militate against its general adoption. On the other hand, one or two municipalities have thought it worth while to make trial of gas-driven vehicles. From the point of view of economy both oil and gas-fuelled vehicles are greatly superior to those using petrol: in spite of the Salter Report, the exceptionally low fuel consumption, small maintenance costs, and absence of fire risk make the compression ignition engine a most attractive proposition to owners of heavy motor transport.

Reviewing the whole situation, it is, in the words of Mr. Wilford, certain that, due to the phenomenal progress made in engine design, the better understanding of combustion processes and consequent production of more suitable fuel, and through increasing and largely successful efforts to improve consumption of both fuel and lubricant, the problem of fumes, so far as the individual vehicle is concerned, should be considerably less acute to-day than in the past.

Coal Utilisation

MR. W. R. GORDON, director of the Coal Utilisation Council, has announced that the Council intends to set up a technical department which will act as a link between the appliance makers on the one hand, and the coal factors and merchants on the other. It is the aim of the council that every coal merchant should be able to recommend the most suitable appliance to his customers and that the appliance-makers' premises should become extra offices for the coal merchant. A great deal of research, both on technical problems connected with new and improved appliances and the treatment of coal for conversion into oil, or for using it in the form of by-products, needs to be carried out. This the council propose to do through its own technical department, working in conjunction with the Department of Industrial and Scientific Research and other research bodies within the coal trade and in allied industries. Research will also be carried out into methods of distribtuion and methods of selling.

One type of propaganda with which the Council has to deal is the education of local authorities. It has recently come to Mr. Gordon's knowledge that many local authorities are installing foreign fuel plant. In doing so they are making their own problems more difficult. Schools could be more economically and as efficiently centrally heated by solid fuel as they can be by other forms of fuel. Every ton of foreign fuel sold is helping to put the British miner among the ranks of the unemployed, and his unemployment helps to swell the ranks of the unemployed in other industries. The local authorities themselves are compelled out of their rates to find more money for unemployment relief. If this fact were more widely recognised and coal central heating plant more widely known among the local authorities Mr. Gordon is convinced that they would never consider the question of utilising a foreign fuel.

The Functional Testing of Chemical Plant

Some Theoretical Aspects

We give below extracts from a paper read at a meeting of the Institution of Chemical Engineers on December 14, Mr. J. Arthur Reavell, past-president, presiding. The author of this paper was A. L. Bloomfield.

THE functional testing of chemical plant relates particularly to the operation or process which it is the function of the plant to perform. It may be defined as "the quantitative observation of a function," and is to determine whether the plant is functioning in a satisfactory manner. In the test proper, certain quantities have to be measured or calculated from observations. First, there are the dimensions of the plant, such as areas of transmitting surfaces, cross-sections, etc. Secondly, there are quantities which may be described as intensities, such as pressures, temperatures, concentrations, etc. Thirdly, there are quantities of the nature of rates of flow, or amounts of substances passing or operated upon in a given time. In working-up these results the values which may usefully be derived from them may be classified under three general headings of efficiencies, capacities, and co-efficients of performance.

Quantities Observed in Testing

The measurement of the dimensions of the plant scarcely calls for theoretical treatment beyond remarking that it must be on the same basis as that of the flows. If it is a question of heat transfer, for example, the dimensions to be measured must clearly allow of the area, across which the flow of heat is measured, being obtained. When the walls are thin this is a simple matter, but when they are thick and of irregular shape care is needed to avoid peripheral error. Dimensions will usually be obtained from drawings of the plant.

The measurement of pressure, temperature, concentration, etc., requires no theoretical discussion, except to remark that in a test extending over a period it may be necessary to make a number of observations and derive a suitable mean. The measurement of flow, however, forms the main subject of a functional test. Chemical plant exists for the purpose of carrying materials through a succession of changes, and involves therefore (*a*) mechanical or kinetic flow, which is change in position, and (*b*) physical or chemical flow, a somewhat metaphorical use of the term, which is change of condition. The former may be defined as the amount of a substance passing from one portion of space into another in a given time, and the latter as the amount of a substance passing from one state or condition into another in a given time.

Taking a simple concrete case as an illustration, in a soda concentrator undergoing tests observations would be made of (*a*) the rate of supply of heat; (*b*) the rate of introduction of weak lye; (*c*) the rate of efflux of water vapour; and (*d*) the rate of production of concentrated soda solution. There is obviously a relationship between these quantities, which so far as direct measurement is concerned purports to account for all that has gone in and all that has come out. It might be said, somewhat loosely, that the total input is necessarily equal to the total output, but a closer examination of the problem shows that a number of points must be settled before this "obvious" generalisation can be applied in a practical way.

In such a soda concentrator there are three entities or substances in terms of which all the measured streams may be expressed—heat, water and soda. The weak solution is a mixture of soda with a large quantity of water, the strong solution a mixture of soda with a smaller quantity of water and some heat, the vapour a mixture or "physical compound" of water and heat. If all of the input and output streams are analysed into these three components there are no longer any sources or sinks, and if the measurements of the flow of each component are expressed in terms of units whose size is independent of its condition, the equation of flow, input + initial contents = output + final contents, will hold good for each component independently.

Testing the Plant

In applying the foregoing principles and methods to the actual testing of a plant, the first step is to consider what are the units of the plant in which unit operations occur. Each of these should be so chosen that the flows into and out of it have a rational significance relative to the object for which the test is being made. No further subdivision should be made than will contribute to this object. The whole plant is thus divided into regions by means of continuous surfaces, part of which will consist of the plant walls, and part of imaginary surfaces across the ducts. Each of these regions is represented by a time-series of cells on the general flow-diagram. The second step is to decide on suitable unit periods of operation. These must also be chosen with regard to the object of the test. With a continuous plant it is usually possible to employ a long period and average the conditions, provided that they are fairly uniform. The total input and output then becomes great in comparison with the difference between the initial and final quantities, which practically cancel out. Here only a single set of cells is required, as in the usual form of flow-sheet. For an intermittent plant there is need for careful consideration. If only a general idea is required, the test period may include a number of batches, the initial and final conditions being the same. The treatment is then the same as for a continuous plant.

Practical Tests

The third step is to consider each region in detail, classifying the probable flows into definite streams, and representing them by lines on the diagram, taking care that nothing is omitted. Every line of flow must have two ends. If it does not connect to another cell it must be carried out across the marginal boundary. Initial and final quantities are, of course, represented by horizontal flow lines. If, as will usually be the case, the results of the tests are to be tabulated instead of being inserted on the diagram, the cells and flow-lines should be suitably numbered for purposes of reference and accounts can then be built up as desired.

Practical tests may now be made. In general the procedure consists of (*a*) the determination of the total quantity flowing in each stream during the test period; (*b*) the analysis of each stream into the substances contained in it; (*c*) the expression of the quantities of each substance, and consequently of each stream in terms of suitable components; and (*d*) the tabulation of the results in suitable accounts. The final step, referring still to the flow test, is to check the results. The equation of flow should be satisfied, that is, the account should balance (*a*) for each component independently with respect to its flow into or out of any cell or complete group of cells including the whole plant; (*b*) for any group of components or for the total in the same way; (*c*) for each component independently with respect to its entering or leaving any condition of combination or mixture; and (*d*) for any group of components or for the total in the same way. Any discrepancy indicates an error, possibly an omission or leakage, within the portion of plant and interval of time represented by the cell or group in question.

Methods of Computation

The measurement of the total quantity in a stream and analysis of a sample is not the only possible method of obtaining the required flow of constituents. It is also possible in some cases to measure one or more components directly. If a stream, of total quantity Q consists of n constituents in quantities q_1, q_2, q_3, $-q_r$, $-q_n$, then n measurement will be required to determine the $n+1$ quantities, the remaining one being obtained by addition or by difference, but if one more measurement is made there is a check on the results.

The foregoing description assumes that all the measurements are possible. In practice some may be difficult and others impossible. Further, it is impracticable to secure samples and measure the contents at various parts of a plant instanteously. The latter difficulty can often be made of little account by using a long test period, and making the observations in the same order at the beginning and end of it, so that the errors are relatively small. Often, too, the measurement of some of the quantities cannot be easily made, and then the checking of results for every cell by the equation of flow is omitted. The equation is used instead to calculate some of the quantities by observing the others. It is usually

possible to apply the check to the complete input and output of the whole plant over a considerable period, to discover if any unobserved losses are occurring. It may usually be assumed that a balance for the whole plant implies a balance for each cell, but this is not necessarily so, as there may be compensating errors. These will occur where there is leakage from one cell to another.

Short Cuts on Testing

As there are for each cell as many independent equations as there are components, the number of observations per cell may be diminished by one for each component, that is, for the whole plant either one component may be omitted entirely or one stream per cell may be obtained by difference.

Where there are only two streams to a cell, one entering and one leaving, the amounts of components must be the same in each. It does not follow that they are in the same condition, but the quantities must agree, and one can therefore be assumed, provided there is some independent way of determining the condition if this is required. The same method may sometimes be applied for a special component which is known to be confined to two streams, even when there are more than two. This simplification may sometimes be applied through a long series of cells. The plates of a rectifying column form a series of cells, each having five streams, vapour in, vapour out, liquid in, liquid out, and heat loss. The heat component is present in all five, but in a large, well lagged column the loss is relatively small, and in many cases the heat in the liquid may be neglected in comparison with that in the vapour, so that in an approximation the heat is taken as confined to the two vapour streams. It is therefore constant throughout the series of cells.

When, moreover, the nature of a process is such that a knowledge of its physics and chemistry is sufficient assurance that certain components must combine in certain proportions, one only need be measured and the other can be calculated. In the evaporation of water under known pressure, for example, if the amount of water evaporated and condensed be measured, the amount of heat supplied to it can be calculated from its known latent heat. This principle may be usefully applied to problems such as the testing of a rectifying column. There is considerable practical difficulty in measuring the actual flows of liquid and vapour for each plate or cell, but if the flow of heat be known, either by assuming it constant or by allowing for radiation losses, then the total of the material components in the vapour stream is calculable, if suitable units are employed. Such units are the quantities of each constituent evaporated by a unit of heat, and will be expressed numerically by the reciprocals of the latent heats. The total being known, it is only necessary to express the analysis in terms of the same units, and the flows of all the constituents may be obtained.

Plant Efficiencies

Efficiency or yield is essentially a dimensionless number, a ratio between two flow-quantities of the same kind. The mere statement of a rate of flow conveys no impression whether a plant is functioning well or otherwise, but its ratio to another rate of flow may give such an impression instantaneously. A number of such ratios may be stated, many of which have intelligible meanings and may be termed efficiencies in a general sense, but there is a irresistible tendency to ask what, after all, really is the efficiency of the plant? The answer is that for each component the ratio having the closest relation to the ultimate cost of the product has the greatest claim to the title, but that there are as many efficiencies as there are components entering the plant, and the selected ratios for each of these must take precedence in the order in which they contribute to the final cost. When there is but one component, and then only for certain types of unit, it is sometimes possible to state definitely that a certain ratio is the efficiency of the plant.

The terms yield and efficiency in a stricter sense are not quite interchangeable, as it is customary to use the name yield when the ratio is between quantities of material, and efficiency when it is between quantities of energy. The yield of a chemical process is strictly comparable with the efficiency of a power-conversion process such as the functioning of an electric motor. The latter, however, is hardly a chemical plant, which must necessarily be concerned with the processing of materials. Yield in a chemical process may reasonably be employed with reference to the primary components which enter in the raw materials and leave in the product, including energy when it is a primary component. Efficiency, on the other hand, is best employed with reference to the subsidiary components, usually energy, which do not form part of the product but assist in the operation. In the former case, "the yield" referred to any one component is the proportion of the amount of the component in the raw material, which emerges in the finished product. In the latter case it is the proportion of the energy supplied which is utilised in the performance of the desired operation.

Points from the Discussion

Mr. J. H. WEST spoke of the tendency of manufacturers of chemical plant, through being asked for guarantees, to put in a plant much larger than should be necessary in the ordinary course and, at the same time, involving a much heavier capital expenditure. From this point of view the question of efficiency had been very much neglected. When one considered that very little work had been done on plate efficiency it was surprising that they worked as well as they did in everyday practice. Then there was the question of velocity and time of contact. He suggested to those in charge of chemical engineering departments at the colleges that the design of bubbler plates and plate efficiency generally was a subject that was almost untouched as a field for research. It was fairly certain that some of the still manufacturers would supply a few plates for this purpose. Another point in connection with testing chemical plant was that of checking drawings before the plant was ordered. That was the time when the checking should begin particularly in view of the natural desire of the makers to cover themselves as regards size when they were giving guarantees. One instance that had come under his notice was that of a foreign maker who supplied a still under guarantee. The plant was worked for some time and it was decided to replace the coils with new ones made in this country. When the necessary calculations were made it was found that the foreign manufacturer had put in 19½ sq.m. of surface whereas it was found that this was giving the same results as could be obtained with 6 sq.m. of surface.

Differences in Estimates

Dr. W. R. ORMANDY also spoke on the question of plant manufacturers putting in apparatus far above the necessary size for the output required and specially mentioned a case in which three fractionating columns were provided by a firm which had been given the necessary information of the requirements. There were 25 plates in this plant but it was found some 12 months or so later that only a few were in real working order and yet the plant was giving the same efficiency then as it did at the beginning! Another point to which he drew attention was the extraordinary manner in which estimates for plants to fulfil the same purpose varied so enormously and that he attributed to the same desire on the part of some firms to put in a much larger plant than was really necessary, in order to cover themselves as regards the guarantee.

Mr. A. E. ALLIOTT, commenting on the suggestion that the Chemical Plant Manufacturers' Association should co-operate in producing papers relating to actual tests of plant, said he knew the association as a body would be only too pleased to do this. At the same time, he pointed out that it was seldom the plant manufacturer had an opportunity of testing the plant thoroughly until it was in position in the works of the user and then as soon as it was completed the user was anxious to put the plant into production. The manufacturer would be regarded as a nuisance if he sought the opportunity because the user had to turn out certain products in certain times and anything that interfered with that could not be tolerated. He had had some extraordinary experiences in this connection. In one case he had arranged for an eight-hours test but after the first half-hour the users of the plant said they had seen enough and went away. This indicated the lack of interest shown by users in tests that would give information of a practical nature upon which to base any standard of testing.

Handling Compressed Gases and Volatile Liquids

By FRANKLIN R. FETHERSTON

In view of the need for information on storing and handling compressed gases, to which editorial reference was made in The Chemical Age, August 13, 1932, page 137, we give below extracts from a paper presented at the 21st annual congress of the National Safety Council, held at Washington, October 3-7. The author is secretary to the Compressed Gas Manufacturers' Association, New York.

The compressed gases that are used most frequently in industry to-day may be grouped into six classes based upon similarity of characteristics that permit their storage and handling in containers of like design. Whether in the liquid or gaseous phase, all gases expand with increase of temperature, resulting in an increase of pressure within the container in which the gas is stored; and, conversely, decrease of temperature decreases the pressure exerted upon the wall of a gas containing cylinder. It is therefore evident that in order to design pressure vessels for these commodities, reasonable limits of temperature range had to be determined. This the industries have done, and accepted after much experiment and experience, 130° F. as the maximum temperature the content of an uninsulated portable container will reach while in transportation, and 105° F. as the maximum temperature that may be attained in insulated containers, under similar conditions. In the United States, normal atmospheric temperature is considered to be 70° F., and that temperature is used as the basis for establishing working or service pressure for design calculations. Having established the maximum temperature to be considered, it is evident that cylinders charged with a liquefied gas should never be liquid full at this upper limit of the temperature range (130° F.), for it is most essential that hydrostatic pressure should never exist in a cylinder of liquefied gas.

Thermal Expansion

Under hydrostatic conditions a tremendous increase in pressure due to thermal expansion of the liquid may be caused by a relatively slight increase in temperature, resulting in possible damage to the cylinder, or release of the gas through functioning of the safety devices. Gases should be charged into containers at densities not greater than the maximum accepted by the industry, for these densities are calculated to prevent hydrostatic pressures under the conditions mentioned. In the following table are given the maximum permissible filling densities of the more important liquefied gases, expressed as the ratio of the weight of gas allowed per pound of cylinder water capacity:—

Chlorine and sulphur dioxide	125 per cent.
Methyl chloride	75 ,,
Carbon dioxide, nitrous oxide and hydrogen sulphide	68 ,,
Anhydrous ammonia and monomethylamine	54 ,,
Propylene	44 ,,
Ethylene	33 ,,
Liquefied petroleum gases depending upon sp. gr. (0.271 to 0.634)	26 to 57 ,,

Similarly, in order to insure against excessive pressures at the upper temperature limit in cylinders containing gases that are not liquefied or dissolved, a maximum ratio of pressure at 70° F. to allowable pressure at 130° F. had to be established. Experience proved that this relation should not exceed 1 to 1.25, and consequently all cylinders charged with non-liquefied gases that are not in solution, to be properly protected against excessive pressure due to temperature increase, should be so charged that the pressure at 130° F. will not be greater than 1.25 times the pressure at 70° F.

Preventing Excessive Pressures

With one exception, all compressed gas containers are equipped with safety devices designed to prevent the building up of excessive pressures within the container. The type of device used varies somewhat according to the nature of the gas and the type of cylinder, but the principle involved is the same in all cases. The safety device is intended to eliminate the bursting hazard, a hazard that is present in any type of pressure vessel in proportion to the amount of potential energy stored in the container. Proper designs and capacities for these devices have been developed by the compressed gas industry to suit each commodity and the consumer into whose hands the cylinder eventually comes should never attempt to repair or alter these devices in any way.

Cylinders containing compressed gases are carefully inspected at the charging plant before being shipped. When they are delivered to the plant where the gas is to be consumed they should not be dropped or thrown about or given other rough usage; nor should they be used for rollers. Every cylinder should be plainly marked by the gas manufacturer with the name of its gas content and care should be exercised to see that this marking is kept legible. Colour schemes for identifying gas cylinder content are not recommended. The Compressed Gas Manufacturers' Association has maintained that the designation of the content of any compressed gas cylinder should be by the imprinting of the name of the gas contained upon the cylinder in letters at least one inch high.

Cylinder Valves

Cylinders that are furnished with valve protection caps by the gas manufacturer should be kept capped until needed, as this cap in many instances is intended not only to protect the valve from external injury, but to keep foreign substances from the valve that might create an unsafe and hazardous condition. An example of this is protection of the oxygen valve outlet against oil or grease. Cylinder valves should be kept tightly closed except when in service, and every user of compressed gas should be very particular to see that the valves are tightly closed on empty cylinders before returning them to the gas manufacturer. Other essential precautions that anyone handling compressed gases should observe are outlined in Safe Practices Pamphlet No. 05 of the National Safety Council, and in a pamphlet issued by the Compressed Gas Manufacturers' Association.

Of the six groups of gases previously mentioned, the first is reserved for acetylene because of all the commercial compressed gases it alone has to be dissolved in a suitable solvent in order to make its storage for transporation in economical quantities, practical and safe. The shipping container for this gas is usually made with a seamless drawn shell or body with one or both ends welded or brazed under certain restrictions. The cylinder is completely filled with a porous mass which is saturated with a suitable solvent, and the gas is dissolved in this solvent under pressure, the maximum permitted filling being 250 lb. per sq. in. at 70° F. The fusible plug type of safety device used in acetylene cylinders is designed to melt at temperatures within the range 208° to 220° F. At pressures exceeding 15 lb. per sq. in. gauge, free acetylene may decompose, and it is, therefore, essential that this pressure is not exceeded in acetylene consuming equipment. Copper tubing should never be used for piping this gas, for under certain conditions acetylene reacts with copper to form copper acetylide, an explosive compound. This is not true, however, of brasses or bronzes.

Liquefied Gases

The second group includes such liquefied gases as anhydrous ammonia, sulphur dioxide, methyl chloride, and monomethylamine, because these gases have relatively similar characteristics which require their storage in similar type containers. The service pressures for which the containers for these gases are designed are slightly different, however, being 150 lb. per sq. in. at 70° F. for methyl chloride; 300 lb. for monomethylamine and sulphur dioxide; and 480 lb. for anhydrous ammonia. Two general types of containers are commonly in use; the seamless drawn cylinder and a type of cylinder fabricated from forge lap welded pipe of Bessemer steel.

Cylinders for these gases, with the exception of anhydrous ammonia, are fitted with safety devices of the fusible plug type designed to melt at temperatures between 157° F. and 170° F. The frangible disc type of device is sometimes used on methyl chloride cylinders designed for test pressures of at least 450 lb. per sq. in., and on small sulphur dioxide cylinders of 35 lb. gas capacity, or less. Both methyl chloride and sulphur dioxide find use in a field where it seems necessary

for the gas to be transferred from the shipping container into small cylinders. This procedure should be approached cautiously and if properly done involves no great hazard. The amount of gas so transferred should be accurately weighed to ensure proper filling density in the small container.

Cylinders should be stored in a cool place and except for the long type ammonia container, should preferably be placed on end so that the liquid in the cylinder is kept away from the valve. The withdrawal of ammonia from a plant into empty cylinders should be done in accordance with instructions that are furnished by the gas manufacturer. It is apparent that such cylinders should not be over-charged, for in that event a serious hazard would be created which might result in damage to the container and grave inconvenience to employees.

Oxygen and Hydrogen

The third group consists of the non-liquefied gases such as argon, helium, hydrogen, nitrogen and oxygen. These are stored and transported usually at pressures between 1,800 and 2,000 lb. per sq. in. at 70° F. Here the primary hazard is a cylinder failure hazard, but as previously mentioned excessive pressures that would cause cylinder rupture are prevented by the requirement that the pressures of these gases in a cylinder at 130° F. must not exceed 5/4 times the pressure at 70° F., the latter being 3/5 of the pressure at which these containers are tested at prescribed intervals. In addition, safety devices of the frangible disc type are used, usually being built into the cylinder valve, the designed to operate at the test pressure of the cylinder, so that stresses in excess of that obtained at test pressure cannot be reached.

Argon, helium and nitrogen are inert gases and require no special attention other than storage in places where the containers, or the valve equipment, will not be damaged or exposed to excessive temperature. Cool, ventilated storage is most desirable. Cylinders of hydrogen and oxygen should be similarly stored, but further precautions should also be considered in their respective cases, because of the chemical activity of these gases. While oxygen is not a flammable gas, it is a supporter of combustion, and should preferably be stored separately and away from cylinders of flammable gases such as hydrogen and acetylene. Oxygen under pressure reacts actively with oil or grease and the gas should, therefore, be kept from these materials. Oxygen cylinders, moreover, should not be handled by workmen with greasy or oily gloves.

Distribution Piping

If manifolds are required for coupling two or more cylinders, so that the gas may be piped to fixed stations for utilisation, only equipment furnished by a reliable compressed gas or apparatus manufacturer should be used. Distribution piping from the manifold to the point of consumption should be tight and positively free from oil or grease. If threaded joints are used in such a piping system they should be made tight with a little litharge (lead oxide) mixed with glycerine. Under no circumstances should white lead or ordinary pipe compound be used. Welding is a very satisfactory and economical method for making joints in gas distributing systems. It is safer and in the end always more satisfactory to utilise the services offered by the gas manufacturer to install, or give instructions regarding the installation of the correct equipment with which to utilise any compressed gas.

The fourth group of gases embraces the liquefied gases such as carbon dioxide, nitrous oxide and ethylene, which are stored as liquids under relatively high pressures. These gases are stored and handled in seamless cylinders designed for service pressures of 1,800 lb. at 70° F. or greater. The same general precautions are to be observed in the handling and storage of these gases that were mentioned for the third group of gases.

Nitrous oxide is a supporter of combustion similar to oxygen and should, therefore, be handled in similar manner. It should not be stored with inflammable gases or near flammable materials. Its principal use as an anæsthetic demands that the cylinders be kept clean and clearly marked to indicate their content. Carbon dioxide is an inert, non-flammable gas and requires no special attention other than storage in a cool, well-ventilated space. Ethylene is a flammable gas and should be stored and handled as such.

The fifth group includes chlorine and hydrogen sulphide, both of which are stored as liquids and shipped in containers at relatively low pressure compared to the gases in group four. The pressure for which the containers for these gases are designed is 480 lb. per sq. in. at 70° F., or greater. Cylinders containing chlorine or hydrogen sulphide should be stored in cool, well-ventilated places. The hazard involved is not from cylinder failure as is the case with some of the other gases, but from the fact that these gases are harmful to the lungs and other respiratory tissues. Gas masks should be readily available in places where these gases are used. If it is ever necessary to warm cylinders of chlorine or hydrogen sulphide to promote more rapid discharge, extreme care should be taken to prevent temperature above 125° F., as the fusible plug safety devices used on cylinders of these gases melt within the range 157° F. to 170° F. Direct heat of any kind should never be applied.

Cylinders should be stored in an upright position in order to keep the liquid from the valve, and it is desirable to use a rack of some kind to prevent accidental upsetting. Operators in plants utilising these gases should be thoroughly instructed in the application of first aid in cases of gassing.

Group six covers the liquefied petroleum and liquefied hydrocarbon gases, a class of material that may be blended to produce compounds with vapour pressures varying from 23 lb. per sq. in. at 70° F. to 145 lb. per sq. in. at 70° F. Higher vapour pressure products are possible, but industry has not made commercial use of any products with vapour pressures greater than 145 lb. at 70° F. Containers for such liquefied petroleum gases must be handled with the same precautions observed in the cases of cylinders of other flammable gases.

Tank Car Hazards

Liquefied petroleum gases are utilised in quantity in many important industrial processes such as enriching of city gas of low calorific value, heat treatment and carbonising processes. Where the consumer requires these gases in bulk, they are transported from the gas producing plant in suitable tank cars.

In handling tank car quantities of gases, the same general precautions applying to cylinders of gases have to be observed. The liquefied gases should not completely fill the lagged container at 105° F., nor the unlagged container at 130° F. All filling of containers should be done by accurate weighing and the prescribed loading densities should not be exceeded. Tank cars of gases should be unloaded only on a properly protected track of the consumer. It is certainly wise and in the interest of safety to place caution signs on the ends of a car being unloaded, leaving them in place until the car is disconnected. If cars are stored on a dead end siding they should be protected on the switch end by a derail. If on an open end siding derails should be provided at both ends. Unloading operations should only be performed by reliable persons, properly instructed and made responsible for the operation.

American Clay Industry

Sales in 1931

FINAL figures relating to sales of clay in the United States during 1931 have just been issued by the United States Bureau of Mines, Washington, D. C. The compilation shows that 2,519,405 short tons, valued at £1,670,200 (at par) were sold by producers in that time, a decrease of 36 per cent. in quantity and 33 per cent. in value as compared to 1930. The figures include only clay sold as such or mined under royalty, and does not list the much larger quantity mined and used by clay products manufacturers on their own property. Clay imports in 1931 also declined as compared to the previous year. Total imports were 190,600 short tons, with a value of £307,200 (at par). This represents a 33 per cent. decline in quantity and 43 per cent. reduction in value. Kaolin amounted to 79 per cent. of the imports. Exports of clay from this country totalled 106,703 tons, with a value of £248,970 (at par), or 22 per cent. lower in tonnage and 24 per cent. under the value of the preceding year. Fire clay exports were 42 per cent. of the total in 1931. Kaolin sold by producers in the United States in 1931 was 443,300 short tons, valued at £589,150 (at par), against 533,800 short tons, valued at £778,760 (at par) in 1930. Ball clay sold in 1931 was 83,000 short tons, valued at £127,960 (at par), as against 93,488 short tons with a value of £147,960 (at par)

Problems in the Application of Paint

Future of Films Applied to Plaster and Cement

At the monthly meeting of the Oil and Colour Chemists Association, which was held at the Institute of Chemistry, on December 7, Mr. H. M. Llewellyn, of the Building Research Station, Watford, gave a general account of the investigations which have been carried out on problems of painting on plaster and cement. Although at one time the Building Research Station dealt with a certain amount of experimental work in connection with paint itself, that was discontinued when the Research Association for the Paint and Varnish Industry was formed and since then the work in this connection has been confined to the effect of different surfaces upon paints. The main questions that have been under review are (1) the causes of the various defects which occur in paint applied to plaster and cement; and (2) steps to be taken to prevent or minimise the risk of failure.

At the commencement of these investigations it was decided to study the problem in its relation to linseed oil paint and a distinction was made between the purely physical effects, such as blistering, peeling and flaking, and those due to chemical action. The latter include softening and stickiness due to saponification of the oil, and bleaching or discoloration of the pigment. A series of tests were carried out, the results of which supported the idea that soluble soda and potash were the ingredients of building materials which are the most harmful to paint, and the general conclusions arrived at were stated to be that in a material painted with linseed oil paint the presence of free lime is not alone sufficient to cause the paint to fail by saponification, but if soluble compounds of sodium or potassium are also present failure from such action may easily occur unless the material is dry. If it is moist, quite a small amount of these alkalies may cause the destruction of the paint film. It is recognised, however, that variations in the quantity of the linseed oil and other ingredients of the paint used might involve some modifications of the above conclusion and it is not known how far the results might be applicable to other oils.

Stability of the Paint Film

Assuming the general conclusion to be correct, it was possible to predict with some certainty the probable chemical action of any building material on paint simply from a knowledge of its content of free lime and soluble alkali compounds. Such certainty, however, was by no means possible if the free lime alone was considered. With this in view, three classes of material were investigated, *viz.*, lime plaster, calcium sulphate plasters and cements. The results of the tests showed different results with different types of plaster and also indicated that the presence of salts in the background of the plaster influenced the degree of stability of the paint film. The tests also indicated that drying must be complete before the paint is applied. Speaking generally, it was suggested that there is no means at present of telling, other than by actual test, how any given plaster will affect paint and that a sample of the plaster should, therefore, be tested in the manner described in the paper before being used in bulk on a job. Analyses carried out on a large number of commercial samples of Portland cement have shown that soluble soda and potash were present in every case. If an alkali-free Portland cement was commercially available this would solve the problem of decoration. The one factor that is of any real significance in determining the "paintability" of cement is the moisture content, but so far no satisfactory test has been discovered which will show when a safe state of dryness has been reached. Experiments have also been carried out with washable distempers and they have been found to be free from saponification. The disadvantages, however, are that other paints cannot be applied satisfactorily over a bitumen distemper and that the latter can only be removed by means of organic solvents.

Speaking of physical causes of failure, moisture is the cause of blistering, peeling and flaking, and the effects are greatly aggravated if soluble salts are present. Since it is the rule rather than the exception to find soluble salts of some kind in most building materials, the best method of ensuring the soundness of the paint is to remove the water which conveys them. There can be no effective substitute for complete drying, but in default of complete drying the alternative is to use a washable distemper as a temporary decoration. After commenting on the absence of information with regard to the use of cellulose lacquers on plaster surfaces and asking for the results of any experience that might be available, Mr. Llewellyn discussed coloured mould growth in paint films and pointed out that the trouble is not to identify them and account for their occurrence, but to discover the best means of eradicating them once they have made their appearance. The ideal treatment appeared to be to strip the plaster, sterilise it and redecorate with a paint possessing fungicidal properties. It was remarked that the Building Research Station is anxious to learn whether there is yet on the market any fungicidal paint which can safely be recommended for house decoration and for use in such places as food factories.

Points from the Discussion

Mr. J. A. Frome Wilkinson, president of the Association, expressed the hope that the author and his colleagues would be able to continue their work, particularly in connection with the theory as to what exactly happens when sodium and potassium salts are present. It would be interesting to know what sort of action other acid radicles, such as silicates, had. It was to be hoped that some of the members would be able to give the author information as regards the use of paints containing tung oil, which apparently resisted saponification more than linseed oil. Information as to the relative rates of saponification of these oils would be valuable, as would experiences with regard to the use of nitro-cellulose. As to mould growth, he believed that Gardner, in America, in 1925 or 1926, tried a number of sterile linseed oils and found that he did not get mould to the same extent as he did with raw oils. That might have some bearing on the subject. Gardner also found that the addition of solvent naphtha seemed to have an antiseptic effect and prevented mould growth.

Mr. A. W. C. Harrison said it was extremely puzzling to account for the action of sodium chloride and he wondered whether with a small percentage of chloride and a large preponderance of caustic alkali, a sufficiently large balance reaction took place to liberate some caustic soda or potash. There was also the risk that trouble was caused through faulty sand which, although washed, had not had all the saline content removed. In that case the possibility of the existence of soluble soda or potash salts must be fairly appreciable. He felt it was dangerous to suggest the use of silicate of soda as a neutralising agent for lime, because there must be a considerable amount of caustic saline product from any such reaction, which might give rise to trouble. As to neutral plasters, if, as he believed, these were prepared by the addition of alum in the kiln process, did not that leave a high content of saline matter which would cause trouble when the plaster was gauged with lime? With regard to moulds some of these thrived on oil paints even when lead was present, although everybody might not be aware of that fact, a damp warm atmosphere as in greenhouses was very propitious to the development of mould and he understood that very effective work had been done by incorporating a little mercury sulphate in the pigment.

Mr. C. B. W. Richardson said he had used washable distempers effectively to prevent caustic alkali effecting the final painting, although the paint was affected when the washable distemper broke down. Nevertheless it held off the action of the caustic alkali for a time.

Glue Binder as Source of Trouble

Mr. S. A. Bone suggested that the percentage of alkalinity is less important than the amount of moisture present, and added, that from his limited experience he believed the paint trade can formulate paints which will withstand all the alkali likely to be met with in any of the surfaces that had been mentioned. The problem seemed to be very much accentuated when there was free moisture in the wall, a certain amount of alkali present and an impervious surface on the

top. If, in conjunction with that there was some source of warmth, such as a radiator near which the moisture was drawn to the surface, then there must be blistering and an actual pushing off of the paint film even if there was not disintegration of the paint due to alkaline attack. One of the things most frequently overlooked in painting a plaster surface was what was behind the plaster, both as regards quantity and nature. With a plastered surface on a 4½ in. brick wall, the back of which was not exposed to the weather, there would not be a great deal of trouble with paint provided a suitable alkali resisting paint was used. If, however, the wall was 18 in. or 2 ft. thick this constituted a reservoir for moisture and then the trouble commenced. He had seen cases in which the failure of the paint on the plaster was absolutely in proportion to the thickness of the wall. In connection with the growth of mould was it possible that in the case of distempers this was due to the glue binder forming a more suitable feeding ground. It had been mentioned that growths did not occur when highly boiled oils were used and it might be that in the boiling of oils at high temperatures aldehydes were formed which acted as sterilising agents.

Mr. T. M. ROSA asked if there was any information available concerning synthetic resins and the attack on paint and also the formation of moulds. If saponification was one of the troubles it would be interesting to know what effect various types of synthetic resins would have on the life of the paint and also on the growth of the mould.

Mr. W. GARVIE said he had never known moulds feed on shellac unless the film was alkaline. With the faintest trace of acidity there would be no mould growth on shellac. Practically all moulds had a very definite *pH* value in which they would grow according to the species. At the same time moulds would not grow on mercuric chloride if it was kept dry, but he had seen a beautiful growth of Penicillium on moist arsenious sulphide.

Mr. LLEWELLYN, replying to the discussion, said he had no exact information as to the dangerous moisture content and he did not know that it was possible to give such a figure in the case of building materials. At the same time it could be taken that if a wall was dried out for a number of weeks most of the risk of physical failure had been avoided. On the other hand, it took a considerable time to dry out sufficient moisture to be able to say there would be no chemical effects, and that was a point he wished to emphasise. One of the worst cases of mould he remembered was in a food factory in London where the mould was spreading on the ceilings from room to room. The Research Station was asked to recommend something which would not be harmful if dropped into the food and he did not feel inclined to recommend mercury sulphate.

Fire Tests of Building Materials

Proposed Development of Station at Manchester

A CONFERENCE called by the Building Research Station of the Department of Scientific and Industrial Research was held at the Institution of Civil Engineers on December 7, under the chairmanship of Sir Clement Hindley, to discuss the establishment of a fire testing station for the building industry. In recent years requests have been received by the Building Research Station for such facilities, mainly due to a desire to develop old materials in new ways, to explore the possibilities of new ones, or to advance the design of structures of the planning of buildings. The Building Research Station has not been able to accede to these requests, because suitable bases of tests had not been evolved, and because the necessary equipment was not available. The first difficulty has now been removed by the issue of British Standard Definitions and Methods of Test for Fire Resistance, Incombustibility and Non-Inflammability of Building Materials and Structures, but there still remains the need for a laboratory capable of carrying out full tests. In this connection the absence of scientific data made it extremely difficult for the Steel Structures Research Committee when drafting its Code of Practice for the use of suitable fire resisting casing to structural steel in building. In the same way the L.C.C. Advisory Committee on the amendment of the London Building Act, 1930, stated that its work is considerably hampered through lack of test data.

Three Alternatives

Sir Clement Hindley stated that based on these views and arising out of consultations with the Fire Officers' Committee, the Building Research Station had set out three practicable alternatives. Shortly they were, firstly, the establishment and maintenance by co-operative effort of interested firms, of a testing station of their own; secondly, the establishment of a testing station by the Department of Scientific and Industrial Research at the Building Research Station with the financial co-operation of interested firms and bodies; and thirdly, the development of the Fire Officers' Committee Station at Manchester as a laboratory co-operating with the Building Research Station, the reports being issued by the Station. The conclusion reached in the Memorandum was that the last scheme was the best. But whatever decision was adopted, Sir Clement assured the conference that the Department of Scientific and Industrial Research would endeavour to help in every way.

Sir ROBERT TASKER, representing the L.C.C., said that in this country this branch of research was very badly neglected. The United States, for example, was far more advanced, and at Chicago such a station had been set up. Fire tests had been carried out and experiments on the effects of sudden impact, and sudden cooling by water. He pointed out that the setting up of the Station at Manchester was real economy. He particularly emphasised the great need for authoritative data, and purity from sectional interest. There should be no advertising by individual firms who supplied concrete, steel, etc. Advertising would prevent the public from having any faith in the results, and would be harmful in every way.

Mr. P. J. BLACK, representing the Royal Institute of British Architects, said that they had set up a committee in 1930 to review the situation from a commercial and scientific standpoint, and they had arrived at the conclusion that what was most important was the testing of whole buildings together, rather than separate parts. He pointed out that little could be done by individual effort, in private laboratories, and the matter would have to be taken up in official circles.

Mr. W. H. TUCKEY, for the Fire Officers' Committee, said that he preferred the scheme of a fire testing station at Manchester, if it would be fully occupied, and would give assurance of having enough tests to do.

National Fire Brigade Association's Station

Mr. H. RUSSELL, representing the National Fire Brigade Association, said that a fire testing station, set up in 1897, had been closed in 1919, and the work was now being carried on by the N.F.B.A., who had erected a similar station at Bromley-by-Bow, and was carrying out much useful work.

Dr. STRADLING, director of Building Research, emphasised the need for official work, in comparison to which that done by private individuals or bodies was of small value. He also assured Mr. Tuckey that a station at Manchester would be fully occupied if there was enough capital forthcoming to start it.

The resolution for setting up the fire testing station at Manchester was moved by Colonel C. W. D. Rowe (London Brick Company and Forders, Ltd.), and seconded by Mr. C. J. Kavanagh, representing the British Steelwork Association, who remarked that a fire testing station would be of great value to steel manufacturers. Mr. D. L. Solomon, representing the Imperial Institute Advisory Committee on Timbers, said that the timber trades would benefit by it as well, especially those trades which dealt in Empire timber, the fire resisting properties of which were little known.

Other speakers were Mr. R. Johnston (Association of Floor Constructors), Colonel A. E. Birch (Newall's Acoustic Products), Mr. F. Lassey (Asbestos Cement Building Products), Mr. C. Thain (Wolverhampton Iron Co.) and Mr. R. F. Taylor (Pilkington Brothers, Ltd.).

The resolution was carried.

Rapid Fast, Rapidogen and Rapidazol Colours

Their Development, Constitution and Application

THE production of insoluble azo colours on the fibre in one stage, *i.e.*, without the necessity of applying the active and passive components separately, has been the subject of many investigations. In the case of Nitrosamine Red, the nitrosamine, $C_6H_4(NO_2).N=N.O\,Na$, is obtained by adding diazotised para-nitraniline to excess of caustic soda, and as such is incapable of coupling with beta-napthol. The printing colour is made by mixing caustic soda, beta-naphthol, nitrosamine red, acetate of soda and a suitable thickening, such as gum tragacanth, and it is printed on white unprepared cloth. After printing the goods are gently dried and exposed to the air for a few hours, and then passed through a bath of dilute acid, washed and dried. The combined action of the carbonic acid of the air and the dilute acid bath liberates free diazotised para nitraniline from the nitrosamine red, which instantly couples with the beta-naphthol. Other nitrosamines may be used, and Dziewonski, in the "Journal of the Society of Dyers and Colourists," August, 1909, gives full particulars for the preparation and use of the nitrosamine of para-nitro-ortho-anisidine.

This method, however, is not always satisfactory, owing to the alkali liberated on formation of the red. To overcome this difficulty, E. A. Fourneaux (Brit. Pat. No. 764 of 1907) made an addition of suitable acid ethers to the printing colour. These ethers were hydrolysed by the liberated alkali and thus neutralised the injurious effect of the excess of alkali. Suitable ethers are acetin, methyl formate, ethyl oxalate, chlorethyl alcohol and dichlorhydrin. The next improvement was in Brit. Pat. No. 765 of 1907 which consisted in printing a thickening mixture of Nitrosamine Red and the basic magnesium salt of 2-naphthol-1-sulphonic acid, drying, steaming, or allowing to lie until developed. During the steaming or lying the sulphonic group is split off and the diazo-compound couples to its position, thus yielding the same para-red. Later, the 2-naphthol-1-sulphonic acid was replaced by 2-naphthol-1-carboxylic acid, which couples with diazo-compounds, the carboxyl group being split off. The latter has an advantage in that it does not form difficultly soluble and stable salts with the liberated diazo-compounds as does the naphthol sulphonic acid.

Rapid Fast Colours

The next important advance was in 1915 when the Chemische Fabrik Griesham-elektron introduced the Rapid Fast Colours. The latter consists of concentrated mixtures of the alkali metal salts of nitrosamines and an arylamide of 2 : 3-hydroxy-naphthoic-acid. The range has also been extended recently to include mixtures of nitrosamine-alkali salts and alkali salts of other passive components such as bodies containing a methylene group capable of coupling with diazonium compounds and aryamides of 2 : 3-hydroxy-carbazole-carboxylic acid. The arylides may be used in the form of their dry alkali metal salts or as free hydroxy-compounds. A normal salt capable of binding water is also contained and this furthermore minimises the danger of explosion normally inherent in nitrosamines. The earlier products were in the paste form, but recent products are marketed as powders. As examples, Rapid Fast Red GZ consists of a mixture of a sodium salt of the nitrosamine of diazotised 2 : 5 di-chloraniline and the anilide of 2 : 3-hydroxy-naphthoic acid, whilst sodium acetate is contained to bind the water. Rapid Fast Blue B is a mixture consisting of the potassium salt of the nitrosamine of tetrazotised dianisidine, the anilide of 2 3-hydroxy-naphthoic acid, and sodium acetate. Rapid Fast Yellow G consists of the nitrosamine of diazotised 2 : 5 dichloraniline and diacetoacetic-ortho-tolidide.

The print colours are made by pasting the Rapid Fast Colour with cold water and potassium or sodium chromate, adding a thickening such as tragacanth, and a little oleine oil and turpentine. The prints are dried, aged and developed in a hot solution of sodium sulphate in ½° Tw. acetic acid.

The Rapidogen dyestuffs probably belong to one of the two following mixtures. The first, patented by the I.G. Farbenindustrie in 1930 (Brit. Pat. No. 308660) consists of a condensation product of a diazo-, tetrazo-, or diazotised amino-azo-compound with a secondary base containing no sulphonic or carboxylic acid or ethereal sulphite group, e.g., piperidine, dimethylamine, etc., together with a suitable coupling component.

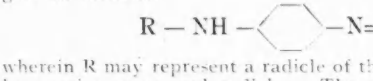
The mixture undergoes no decomposition in water or organic solvents even at 100° C. It is pasted with caustic soda, Turkey Red oil, and thickening medium and printed on unprepared cloth. Ageing is unnecessary and the colours are developed at 80° C. in a bath of 5 per cent. formic acid and 10 per cent. sodium sulphate. The formic acid splits up the amino-azo compound re-generating the diazonium compound which couples with the passive component. The sodium sulphate prevents the naphthol from dissolving off the fibre previous to coupling. A suitable printing paste is composed by 11 parts (by weight) 5-nitro-2-methoxy-1-benzene-azo-dimenthylamine, 15 parts 2 : 3 hydroxy-naphthoyl-para-anisidine, 10 parts caustic soda (40 per cent.), 30 parts Turkey Red oil, 600 parts starch-tragacanth, and 337 parts water. After printing, drying and developing a red shade is obtained, the insoluble azo colour formed on the fibre being the same as that produced when diazotised Fast Red Base B is printed on cloth prepared in Naphthol AS/RL. The condensation products of diazo-compound with secondary bases may be represented by the equations :—

$$R.N : N.Cl + H\,N\,(CH_3)_2 \rightleftharpoons HCl + R.N : N.\,N\,(CH_3)_2$$
$$R.N : N.Cl + H\,N.\,C_5H_{10} \rightleftharpoons HCl + R.N : N.\,N.\,C_5H_{10}$$

The other alternative composition of Rapidogen dyestuff is described in Brit. Pat. No. 334,528 in which a water soluble diazoamino compound is incorporated in the dry state with a coupling component. The diazoamino compound is prepared by re-acting a diazo compound with a primary or secondary amine of the benzene series, containing a carboxylic or sulphonic acid group or both. The compounds are stable towards heat, percussion, friction, neutral and alkaline substances. As an example, diazotised 3-chlor-aniline is run at 0-10° C. into a neutral solution of 2-amino-4-sulphobenzoic acid in presence of sodium aceatte. After stirring for an hour, the free diazoamino acid separates as a yellow substance. Other appropriate stabilising agents are 4- and 5-sulpho-2-amino-benzoic acids, methylamino- acetic acid, aminobenzene-2 : 5-disulphonic acid, carcosin, butylamino-acetic acid, cyclohexylamino acetic acid, dibenzylamino-disulphonic acid, etc. The printing colours are made up and applied as in the previous patent. The advantages of Rapidogen colours over Rapid Fast colours are the greater stability of the printing pastes and the improved fastness to rubbing of the resulting prints.

Rapidazol Colours

This year the I.G. Farbenindustrie have introduced Rapidazol Blue. This is the first member of a new series, which consists of mixtures of a passive component (or its alkali salt) and the alkali salt of a diazo-sulphonic acid or a diazo-hydrazine-sulphonic acid. The diazo-sulphonic acids used are of the general formula



wherein R may represent a radicle of the benzene or naphthalene series or an acyl radicle. The aryl amino group may be substituted in the benzene ring by halogen, alkyl or alkoxyl groups. As an example, 39.8 parts 4 : 4¹ diamino-diphenylamine are tetrazotised by means of 115 parts hydrochloric acid (33 per cent.) and 28 parts sodium nitrate. The resulting solution is poured at 10-15° C. into a solution of 56 parts anhydrous sodium sulphite and 32 parts sodium carbonate in 750 parts water. On adding common salt to the brown solution the sodium salt of diphenylamine-4 : 4¹-bis-diazosulphonic acid precipitates in the form of small brown crystals. The printing paste may consist of 63 parts of this product, 25 parts Naphthol AS, 30 parts caustic soda (40 per cent.), 362 parts water and 500 parts starch-dragon. After printing, the fabric is steamed for seven minutes when sulphur dioxide is eliminated, and coupling occurs. Rinsing and soaping gives a beautiful bluish-black corresponding to tetrazotised p-p¹-diamino- diphenylamine on Naphthol AS.

The Engineering Aspects of Milk Condensing and Drying

A Contribution to the Available Literature

FOR some time past the Hannah Dairy Research Institute has been investigating the problem of the utilisation of surplus milk and of milk residues, such as separated milk and whey. The two outstanding methods available are the manufacture of condensed milk and of milk powder. At the present time practically no milk condensing or drying is carried out in Scotland, despite the fact that the amount of separated milk wasted is sufficient to furnish the whole of the Scottish imports of condensed separated milk. So far as England is concerned, whilst considerable quantities of condensed milk and dried milk are produced, the total production is still but a fraction of the imports of these commodities. Imports of milk powder into Great Britain have increased by 150 per cent., over the period extending from 1924 to 1931, and in the United States the figures are even more striking, the production and consumption of separated milk powder in 1931 being roughly 1,000 per cent. above that for 1918. These figures clearly indicate the scope which exists for the development of the milk powder industry, and in anticipation of such development the Hannah Institute has collected all available information relating to the scientific and technical aspects of milk condensing and drying, whilst research work on various related problems has also been instituted. Bulletin No. 3, already published, deals with the chemical and bacteriological aspect of the manufacture of such products, existing knowledge being reviewed by Dr. L. A. Allen.

Removal of Water from Raw Milk

The latest Bulletin, No. 4*, concerns the engineering aspect, which is principally the economical removal of water from the raw milk. In this connection the Institute invited the co-operation of the Royal Technical College, Glasgow, where Dr. A. W. Scott has been investigating the practical physics of spray drying. In addition, available information from all sources on the engineering aspects of condensing and drying has been summarised and is embodied in this particular bulletin. The underlying principles of heat transfer and evaporation are considered in some detail in Parts I and II, as certain proposed manufacturing schemes submitted to the Institute have demonstrated that quite erroneous ideas may be held regarding the mechanism of heat transmission and the properties of steam and water vapour. In Part III the available data is applied to the principle of vacuum pan evaporation, and various technical problems arising in design and operation are dealt with. Calculations of steam and water consumption are given, and modern developments such as forced circulation evaporators are described. The commercial manufacture of condensed milk is then considered and the various steps in the complete process are outlined. Here an examination of the literature reveals an interesting comparison between the methods of manufacture adopted in the United States and in Germany.

The Drying Processes

Part IV deals with the drying of milk. It briefly reviews the distinguishing qualities of the various grades of milk powder, and summarises general opinions regarding the merits of several methods of producing dried milk. Methods of manufacture are detailed under the headings of "film drying" and "spray drying." Film or roller drying, owing to its simplicity and cheapness, is most popular, but the powder produced does not represent perfection. Spray drying, on the other hand, possesses several advantages, especially in regard to the quality of powder which may be produced. The plant required is, however, rather more complicated and the technique of operation is more highly developed. In addition, spray drying offers potentialities for low thermal efficiencies with consequent high coal consumption. Typical heat balances for several methods of operation are worked out to demonstrate the various possibilities of effecting economy, and commercial practice is represented by a full description of a British spray-drying factory. Throughout the review most attention has been devoted to principles of operation. The vexed question of costs of installation and operation has been omitted, which is possibly a desirable course as initial costs of plants are found to vary enormously with the materials of construction specified, whilst operating costs depend to a large degree on local conditions and the amount of care exercised in manufacture. Average costs of manufacture, obtained directly from firms engaged in the industry, have already been recorded in Bulletin No. 1.

* "The Engineering Aspects of the Condensing and Drying of Milk," by A. W. Scott. Hannah Dairy Research Institute Bulletin, No. 2. Pp. 120. Glasgow: Royal Technical College.

Treatment of Raw Water

Removal of Effluents by Activated Carbon

VARIOUS methods of applying chlorine for the sterilisation of municipal water have already been summarised in THE CHEMICAL AGE (August 13, 1932, p. 146). These methods were concerned with the general cases in Britain and America in which the raw water is affected bacterially but not by effluents from chemical factories or allied industries. When, however, river water contains organic compounds derived from such sources, a condition which is by no means rare in certain American areas, filtration and chlorination are insufficient for yielding a potable water. With amino compounds and phenolic bodies present in traces, chlorination serves to aggravate the nuisance: for chlorphenols in water supplies yield an exceedingly disagreeable taste, as Chicago food manufacturers found to their cost.

Activated carbon is now proving the sole medium of relief from the contamination of water by a number of organic compounds of diverse types. Although the use of carbon was known in this country twenty years ago and the material was included in certain filtration units, yet recent progress in this direction seems to have been in America, the cities of Chicago, Hamburg, and Cleveland being prominent centres of research. Of yet greater interest to chemists in general rather than solely to those engaged by water boards is the recent experience gained at Rahway, N.J., in the treatment of the Rahway River water, which is recorded by M. M. Gibbons ("Industrial and Eng. Chemistry," September, 1931, p. 977). The water in this case contains not only waste from dye and intermediate manufacture which cause a daily rather than seasonal variation, but also effluents from denaturant concerns and from lacquer solvent manufacture.

A Wide Range of Effluents Removed

Successful treatment was not attained by use of the ammonia-chlorine or chloramine process, nor did superchlorination followed by removal of excess with sulphur dioxide produce the desired degree of purification. This, however, was to be expected in water containing traces of aniline and nitrobenzene, while the third method of applying permanganate could hardly have been tried with much hope of success. Certain points in this paper serve, however, to give additional evidence in support of the work done at Cleveland and elsewhere in America. There is the statement that activated carbon can be added at any point prior to the filtration, and that it can be removed from the water by the sand filters and used with slight adaptation in the existing plant at any waterworks. Then there is the advantage of being able to superchlorinate water, without the constant care required in regulating the chlorine dosage when no carbon is to be used to remove excess chlorine. Thirdly, there is the possibility of adding carbon to water containing an alum coagulant.

A high grade of carbon appears to have been used in this new work: for, although the brand is not named, yet the carbon is stated to be derived from soda sulphite liquors and is therefore probably a Nuchar product containing anything up to 97 per cent. carbon. This carbon treatment coupled with a preliminary treatment with potassium permanganate seems to have eliminated completely at Rahway such diverse contamination agents are toluidines, phenols, acetic constituents from the lacquer solvent industries, amyl acetate, and fusel oil.

Storage of Fodder

Means of Preventing Fermentation

PRESERVED fodder should equal as nearly as possible the fresh summer fodder in nutritive value. Hay made in ideal weather is an excellent food, but made in weather such as is common in Northern Europe, 50 per cent. of the original nutritive and vitamin content may be destroyed. Reliable substitutes for traditional methods of haymaking have great economic possibilities. The traveller through the countryside, especially in Scotland, will be familiar with the cylindrical concrete silos, which contain green fodder, preserved by one of various methods of artificial preservation. The product of silo preservation, known as silage, may be prepared independently of the weather, but most of the methods of preparation cause a decrease from the original nutritive value of the green plants.

In countries such as Finland, where the summer is short, efficient methods of artificial haymaking would be particularly valuable. The large Finnish co-operative dairy organisation, Valio, has been interested in research on the problem. Valio has built a laboratory at Helsingfors and engaged Dr. Artturi I. Virtanen as director. According to the "Manchester Guardian," he began research in 1925 on methods of preserving grass as silage, and discovered one of his own. He now claims that his method of preservation conserves the nutritive and vitamin value of the green grass almost completely and without fermentation. The Imperial Bureau of Animal Nutrition has recently issued a technical communication in which the position concerning A.I.V. silage (the name is derived from the inventor's initials) is discussed.

Virtanen assumed that efficient conservation could not be achieved unless fermentation were prevented. He had noticed that fermentation of the proteins in higher plants and bacteria did not occur in the presence of a certain degree of acidity. Experiment showed that grass treated with a liquid containing particularly hydrochloric acid could be preserved almost without damage to its feeding value. Consequently he produced this liquid, which is sprinkled on the fodder.

Allyl Mustard Oil

The final surface is sprinkled with another fluid which prevents the formation of mould. This preparation is important, as mouldering is one of the chief defects to be avoided. Virtanen had noticed that silage prepared from cabbage tops did not as a rule become mouldy even when not properly covered, so he investigated the properties of the mustard oil obtained from plants of the cabbage family. It proved to be very deadly to mould. A solution of allyl mustard oil containing one part in a hundred thousand prevented the formation of moulds. One third of an ounce of this liquid, which is named homesurma, is sufficient to protect the surface of the contents of a silo 16½ ft. in diameter. The effect of homesurma on cows was carefully tested and found to be negligible. The cost of preparing a unit of fodder by the A.I.V. method is the same or rather less than the cost of haymaking.

The milk from cows fed on A.I.V. silage is free from the peculiar taste sometimes noticed in the milk of cows fed on other preserved fodders. The butter has the rich, yellow colour of butter made from summer milk, and the crumbly texture characteristic of ordinary winter butter is eliminated. Acid cheeses made from the milk of A.I.V.-fed cows are also particularly good.

Japanese Bleaching Powder

NOTWITHSTANDING the decline in production in Japanese bleaching powder, as shown by the official figures (in metric tons): 1929—55,085; 1930—44,293; 1931—36,579; January to May, 1932—15,895; the marketing problems of the industry continue. From unofficial sources it is stated that a central sales organisation of some ten firms is to distribute the products of these concerns. Besides bleaching powder, the chief chemicals are caustic soda, chlorine, ammonium chloride, hydrochloric acid, sodium chlorate, cyanide, hydrogen and certain peroxides.

Production of Cadmium

Decrease in the United States

THE production of metallic cadmium in the United States in 1931 amounted to 1,050,529 lb., valued at £81,940, and was equivalent to only 38 per cent. of the record high output established in 1930. The value in 1931 was only 23 per cent. of the value in 1930. Sales of cadmium by domestic producers, however, were 1,544,414 lb., valued at £118,940, compared with 1,664,644 lb., valued at £212,140 in 1930, a decrease of only 7 per cent. in quantity, but of 44 per cent. in value. The average value reported by producers in 1931 was 39 cents a lb. as compared with 64 cents a lb. in 1930. Imports of cadmium dropped from 40,105 lb., valued at £5,583 in 1930, to 271 lb., valued at £37 in 1931.

Chemical Matters in Parliament

Oil from Coal

A SCHEME to provide work for unemployed miners was put forward in the House of Lords, on December 7, by the Duke of Montrose in the form of a question to the Government. He asked whether sufficient capital could not be raised to treat some 8,000,000 tons of poor quality coal by a process of distillation. Lord Templemore, replying for the Government, promised to ask the Mines Department to give consideration to a proposal submitted by the Duke that the disused Naval base at Rosyth should be adapted as a refinery for dealing with coal from the mining area of West Scotland.

Aliens in Beet Sugar Industry

In the House of Commons, on December 8, Dr. Clayton (Chester, Wirral) asked the Minister of Labour whether the British beet sugar companies had just given an undertaking to replace the 18 permanently resident aliens with British subjects?

Mr. Hudson: As these persons are permanently resident in this country, the question of obtaining such an undertaking from their employers does not arise.

Dr. Clayton: Is it not the intention that British subjects should be trained to take the place of these aliens?

Mr. Hudson: I gather that some British subjects were trained, and that the persons who were brought in in anticipation of the training have left the country; but there were others whom it has been found impossible to replace by British subjects, and they have now become permanently resident here.

Anglo Oil Concession

On December 12, questions were put to Ministers about the cancelled D'Arcy concession in Persia of the Anglo-Persian Oil Company.

Captain Eden, Under-Secretary to the Foreign Office, replying to Mr. Morgan-Jones (Caephilly), said that the Government had not yet had a reply from Persia to its latest note on the subject.

Answering Mr. Will Thorne (Plaistow), Captain Eden said that the concession was granted to Mr. William Knox D'Arcy in May, 1901, and was, in accordance with its terms, transferred to the Anglo-Persian Co. in 1909. It was for a period of sixty years. It provides for the annual payment to Persia of 16 per cent. of the annual net profits of the company operating the concession. The total paid in royalties up to December 31, 1931, amounted to £11,265,000. The present holdings of the British Government in the company are 7,500,000 ordinary £1 shares, 1,000 £1 preference shares and £90,000 5 per cent. debentures. The total amount received by the British Government in dividends and interest up to the present time is £9,977,344. Royalties paid by the company to the Persian Government in 1931 amounted to £307,000, against £1,288,000 in 1930 and £1,437,000 in 1929.

A LACQUER consisting of thin scales of aluminium bronze powder rather than the usual form of microscopic grains has recently been placed on the German market under the trade name of "Storal." It is stated that the scales arrange themselves parallel to the surface, thus reflecting 70 per cent. of the light and producing the appearance of an unbroken metal coating.

Economy in Mechanical Handling

Portable and Fixed Conveyors

AT the present time no manufacturer can afford to ignore any channel through which a saving may be made. There is not the slightest doubt that, in nine cases out of ten, a very substantial saving in the cost of handling goods can be made by installing light, inexpensive conveying machinery. Generally speaking, factory handling costs can be divided into two classes. In the first place there is the receiving of raw material into the factory, storing it until required, stacking the manufactured goods and loading out into the lorries or railway vans. Secondly, there is the task of taking raw material from store and passing it through the various stages of manufacture.

Portable conveyors, as shown in Figs. 1 and 2 in the next page, can in many cases halve the cost of stacking and loading out. In addition to the saving of labour, the greatly increased rate of working must also be taken into account, which is a valuable asset when an order is given on promise of quick delivery. For handling material in the course of passing through manufacturing stages a system of fixed conveyors is invariably required, a representative example being shown in Fig. 3.

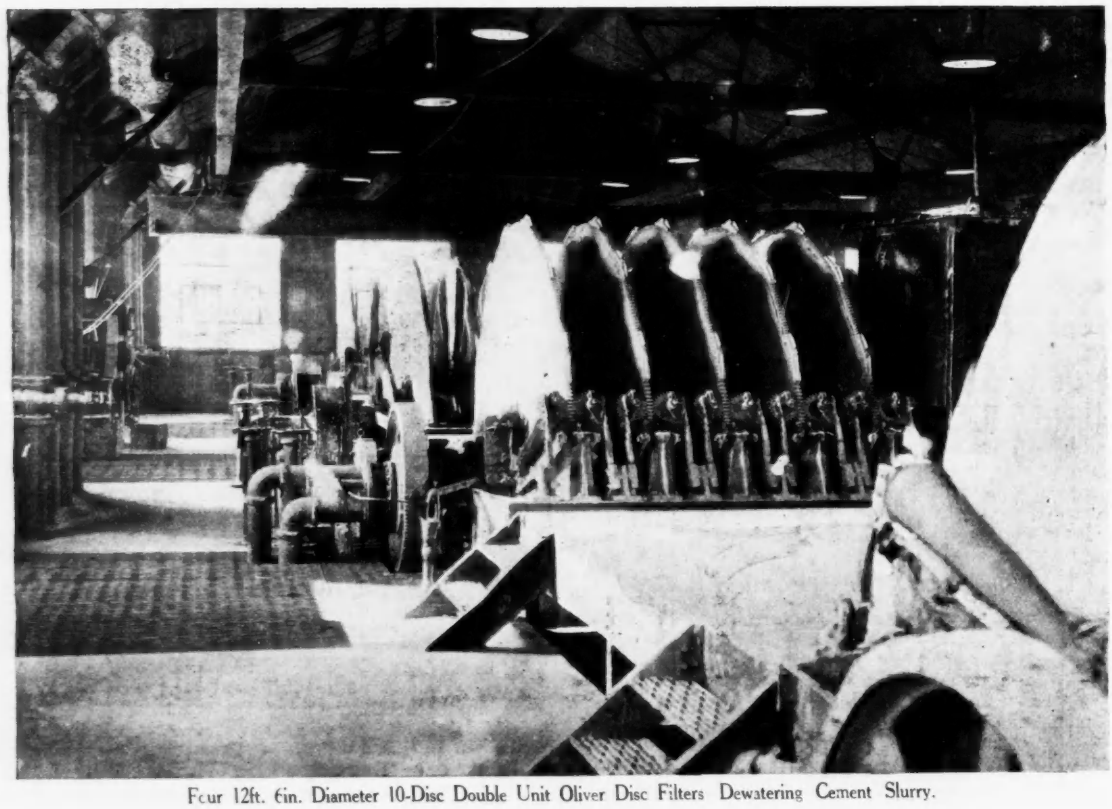
Crone and Taylor, Ltd., who are the makers of the machines here illustrated, have had a wide experience in mechanical handling problems, and make a range of standard portable conveying and stacking machines for handling bags, coal, limestone, coke, foodstuffs, fertilisers, boxes, oxide of iron, etc. They have designed special machines to suit conditions where standard machines could not be employed to the best advantage. They also make fixed conveyors of the belt, gravity roller, steel tray, and chain-and-lath types.

Fig. 1 shows phosphate rock being taken into store by a C. and T. portable belt conveyor; this machine effected a saving of 50 per cent. of the previous hand discharging cost. Fig. 2 shows a C. and T. portable chain-and-lath type stacker piling bags of nitrate of soda in a warehouse; a standard belt conveyor could not be used in this instance as nitrate of soda would rapidly destroy the belt. Fig. 3 shows milk bottles being taken away from a filling machine in crates at the rate of a bottle per second. The crates travel along the gravity conveyor, pass down shoots to a lower floor and are finally delivered into a refrigerator. For labour, two boys only are required, one to fill the crates with bottles, as shown in Fig. 3, and the other to stack the crates in the refrigerator. These conveyors are inexpensive and very soon pay for themselves; the money saved by their use is frequently sufficient to wipe out the capital cost in a few months.

Filtration Plant in Cement Manufacture

A Modern Battery

IN cement manufacture slurry filters are now employed for removal of a portion of the water in the slurry as fed to the kiln, with a consequent reduction in fuel consumption. The accompanying illustration shows a battery of four 12 ft. 6 in. diam. 10-disc double unit Oliver disc filters. The rapid drying of the filter cake on entering the kiln speeds up the material for the calcining and subsequent clinkering zones. Less water to evaporate reduces fuel consumption, and the acceleration of the drying process increases burning efficiency over the entire length of kiln and results in increased clinker output. Other direct benefits which accrue from slurry filtration are a more uniformly burned clinker; the elimination of mud rings; improved raw grinding and the utilisation of flue and precipitator dust.



Four 12ft. 6in. Diameter 10-Disc Double Unit Oliver Disc Filters Dewatering Cement Slurry.

Mechanical Handling Equipment

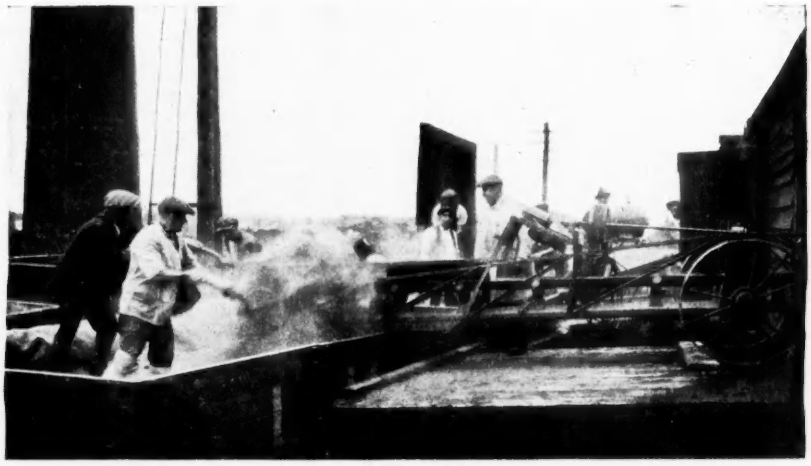


FIG. 1.—The illustration on the left shows phosphate rock being taken into store by a Crone and Taylor portable belt conveyor, This machine effected a saving of 50 per cent. on the previous hand discharging cost.

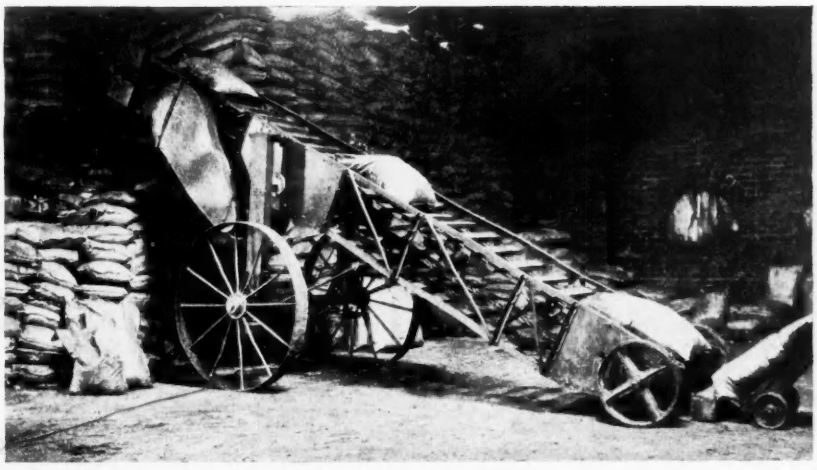


FIG. 2.—In the centre picture is shown a Crone and Taylor portable chain and lath type stacker piling bags of nitrate of soda in a warehouse. A standard belt conveyor could not be used in this instance as nitrate of soda would rapidly destroy the belt.

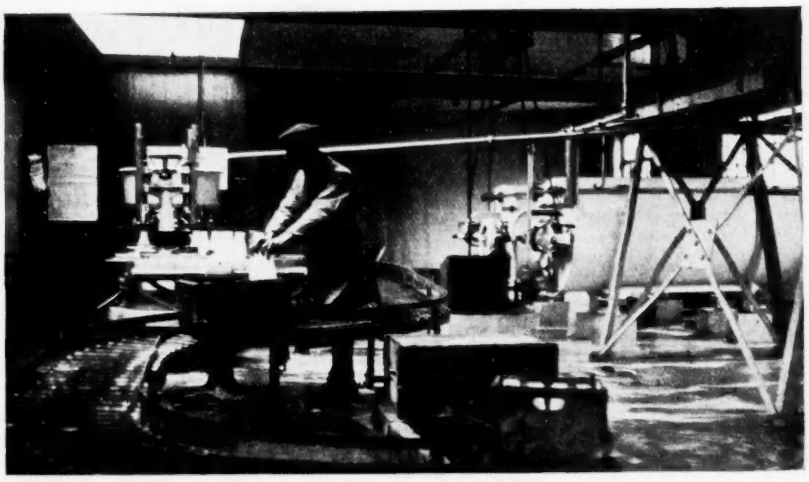


FIG. 3.—The bottom illustration shows milk bottles being taken away from a filling machine in crates at the rate of one bottle per second. The crates travel along the gravity conveyor, pass down shoots to a lower floor, and are finally delivered into a refrigerator.

New Technical Books

QUALITATIVE ORGANIC ANALYSIS. By Oliver Kamm. Second Edition, pp. 311. Chapman and Hall, Ltd. 16s.6d.

THIS book was originally published in 1922, since which date there has been considerable increase in research activities in the development of methods for the identification of organic compounds. The general outline of the text of the first edition has been retained, because of the uniformly happy results attained in teaching work. The book is divided into three main parts. In the theoretical part the solubility behaviour of organic compounds receives early attention, to be followed by classification reactions for hydrocarbons at their oxygen and halogen derivatives, the simple nitrogen and sulphur compounds, and compounds with unlike substituents. In the second part, which is devoted to laboratory directions, we are introduced to the procedure for the analysis of an individual compound; the determination of physical constants and analysis for elements; solubility behaviour and classification reactions considered practically; the preparation of derivatives; quantitative analysis of substituent groups, and the examination of mixtures. The third part of the book is devoted to classified tables covering the melting points, boiling points and specific gravity of over 2,000 compounds, which are in groups classified according to their solubility behaviour and general reactions.

* * *

ANTIQUES: THEIR RESTORATION AND PRESERVATION. By A. Lucas. Second Edition, revised, pp. 240. Edward Arnold and Co, 8s. 6d.

WITHIN the last few years the investigation of methods for cleaning and preserving antiquities has come within the research activities of the chemist. One of the earlier developments in this direction was the establishment of a chemical laboratory at the British Museum, where methods for cleaning and restoring some of the museum exhibits were investigated under a grant received from the Department of Scientific and Industrial Research, reports upon the progress of this work being issued in 1921, 1923 and 1926. Following upon the discovery of the tomb of Tut-Ankhamen at Luxor there was a distinct need for the introduction of new and safer methods of eradicating the ill effects of corrosion on antiquities which were brought to light, and the author of this book carried out a considerable amount of practical work, the successful results of which tempted him to record details of the processes adopted. Since the first edition of his book appeared, now eight years ago, Mr. Lucas has been continuously engaged in cleaning and preserving antiquities at Luxor and at the Cairo Museum, in consequence of which he has gained a considerable amount of fresh experience, and has investigated the possible application of a wide range of methods, using chemicals for removing dirt and corrosion, or for combating the destructive effects of light, moisture, insects, bacteria and fungi. Many of the methods detailed are quite novel, and indicate extended possibilities, capable of being realised in the minor by-paths of applied chemistry. In some cases they foreshadow distinct commercial applications, for the range of materials which have been treated include cordage, matting, beadwork, feathers, hair, glass, ivory, bone and horn, leather, metals, paper, plaster, pottery, stone of various types, wood, and woven fabrics. To take one specific instance, there is preservative treatment applied to bookbindings, where a mixture of beeswax, hexane, cedarwood oil, and anhydrous lanolin is recommended for use. To take other instances, there are the cleaning and preservation of stone used for building purposes or for carvings; the prevention of corrosion on copper, bronze, silver and other metals, and methods of removing mildew stains on paper. The subject matter makes interesting reading, and we are assured that the methods recommended have proved satisfactory in the light of the author's wide experience in a country where perfection in the preservation of national antiquities is regarded as a matter of importance. The author, it may be added, was formerly director of the Chemical Department of the Egyptian Government, and may be remembered for his noteworthy volume on the subject of "Forensic Chemistry," or scientific methods applied to the detection of crime.

PROUT'S HYPOTHESIS: Papers by William Prout (1815-16), J. S. Stas (1860) and C. Marignac (1860). Alembic Club Reprint, No. 20. Gurney and Jackson. 2s. 6d.

THE change in view regarding Prout's Hypothesis brought about by twentieth century physical and physico-chemical investigation affords a suitable occasion for reproducing the original papers of Prout, together with Mr. J. S. Stas the more important nineteenth century papers dealing with determinations made in connection with the hypothesis. Certain details regarding the early history of the hypothesis, together with points correlating the hypothesis with recent advances, are set forth as an introduction.

* * *

CORNELIS DREBBEL (1572-1633). By Dr. G. Tierie. Pp. 124. Amsterdam: H. J. Paris. 1932.

CORNELIS Drebbel, born in Holland in 1572, began his working life as an engraver and turned his inventive genius to the construction and improvement of pumps, mechanical timepieces, microscopes and other ingenious mechanical devices. From 1604 onwards he lived mainly in England, being favourably received by James I, who gave him an annuity and lodgings in Eltham Palace. Boreel, the Dutch Ambassador in London, described Drebbel as "a very cunning man in Nature's secrets, whose fame spread over the whole of the civilised world of that day and remained undimmed for many years after his death." Peiresc and Boyle thought well of Drebbel, the latter describing him as "a deservedly famous mechanician and chymist," but some considered him a charletan. We must, however, remembering the state of physical science of the times as well as the tendency to clothe scientific knowledge with an air of mystery, agree that Drebbel is entitled to a respectable position among the inventors and mechanicians of the early part of the 17th century. The "Perpetuum Mobile," which created considerable sensation, was a clock, probably energised by the alternate expansion and contraction of air with variation of temperature. Drebbels chief claim to fame is his submerged tank, undoubtedly the precursor of the submarine, which he navigated from Westminster to Greenwich. It is difficult to decide whether the confined air was rendered respirable by absorption of the carbon dioxide or actually renewed by a supply of oxygen, cp. "When Drebbel perceived that the finer and purer part of the air was consumed . . . . he would, by unstopping a vessel full of his chemical liquor, speedily restore the troubled air such a proportion of its vital parts as would make it for a good while fit for respiration." In Drebbel's book "De Quinta Essentia" there is an engraving of a large retort over a fire which bears the legend "Saltpetre broken up by the power of fire and so changed into the nature of the air." It is very difficult to avoid the conclusion that oxygen was really known to Drebbel, with whose views on respiration both Boyle and Hooke were in agreement and which furnished the foundation upon which Mayow based his ideas. Dr. Tierle has collected an immense number of facts and statements which help to present Drebbel in a truer light than has hitherto been possible. Upon this foundation, with further research, we may hope for a scholarly summary which will enable us to form a really sound judgment of Drebbel's position as a scientific investigator.

Books Received

Cellulose Acetate. By Alfred George Lipscomb. London: Ernest Benn, Ltd. Pp. 304. 21s.

The General Properties of Matter. By F. H. Newman and V. H. L. Searle. London: Ernest Benn, Ltd. Pp. 388. 18s.

Der Einfluss der Handelsdunger auf das Pflanzenwachstum und auf verschiedene Eigenschaften kalkarmer Mineralboden. By Dr. Ing. L. Schmitt. Berlin: Verlagsgesellschaft fur Ackerbau. Pp. 186. RM9.

Economic Conditions in Venezuela (August, 1932). By R. J. Kirwin. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 38. 1s. 6d.

Good Investing. By K. Adlard Coles. London: Jordan & Sons, Ltd. Pp. 84. 2s. 6d.

The Recovery of Platinum

An Application of Active Carbon

ONE of the most troublesome operations of metallurgical chemistry is involved in the isolation of the platinum group of metals from the dilute solutions of their complex chlorine compounds such as result from the chlorination of low content ores. According to Professor Wöbling, who outlines the process in "Angewandte Chemie," November 12, 1932, page 720, the platinum present in a weak hydrochloric acid solution is instantaneously isolated in the pure condition in almost 100 per cent. yield by treatment with 10 to 15 times its weight of carboraffin. The purity of the absorbed metal is accounted for by the fact that non-precious metals are not as a rule withdrawn from solution by active carbon. Among other metals of the platinum family, osmium and palladium behave like platinum, whereas iridium and ruthenium are only incompletely deposited under the conditions most favourable for separation of platinum. Least amenable to the treatment is rhodium, which remains unabsorbed to the extent of 90 to 95 per cent. Optimum precipitated yields of iridium and ruthenium are 60 to 70 per cent. and 20 to 25 per cent. respectively.

Although both gold and silver solutions are also absorbed by active carbon with subsequent reduction to the metallic state, the process as a whole is not readily applicable to them, owing to the difficulty in final withdrawal of the adsorbed metals. In favourable contrast thereto is the readiness with which adsorbed platinum metals are dissolved out of the pores of the carbon by washing with hot concentrated solution of sodium chloride or hydrochloric acid. Nine-tenths of the total quantity of 12 mg. platinum adsorbed by 0.1 g. of carboraffin was withdrawn by 15cc. of hot hydrochloric acid. The process leaves little to be desired in respect of economical use of active carbon, for no appreciable loss in adsorptive power was perceptible after eight successive adsorptions and hydrochloric acid washing operations.

Other complex platinum salts from which the smallest trace of metal can be isolated with the aid of carboraffin are the compounds with alkali iodides and stannous chloride. So thorough indeed is the separation from the alkali iodide-platinum salts that complete discoloration of the original solution takes place, pointing to a residual concentration of platinum of not more than one-ten millionth gram per cubic centimetre. Palladium and osmium are likewise recoverable in practically 100 per cent yields from the alkali iodide complexes, but the action is by no means so thoroughgoing when applied to iridium ruthenium and rhodium.

Engine Foundry Practice

Growing Demand for Light-Weight Engines

AT a meeting of the Lancashire branch of the Institute of British Foundrymen, held at the Manchester College of Technology, on December 3, Mr. H. E. Beardshaw, of L. Gardner and Sons, Ltd., Patricroft, Manchester, read a paper on foundry practice in relation to engines. Mr. Beardshaw said that the general engineering founder had in the past to cater for all types of engines; the market was large, and as an industry it was free from competition. The automobile (petrol) branch soon grew too large to be conducted on this basis, and required separate and specialised development, with the result that it was now an independent branch of the industry. The large steam engine section, apart from isolated cases, had apparently died, and another manufacturing section was closed to the founder.

This left the intermediate stage occupied by the gas engine, the smaller Diesel engine, or so-called semi-Diesel engine, and latterly, the so-called high-speed Diesel engine, a stage embodying a range of horse powers, say, from 20-30 to 600-800. It was with this latter section that Mr. Beardshaw stated he was particularly concerned. This branch of the industry was undergoing a complete change. The gas engine was on the point of passing out, and the present trend indicated that the semi-Diesel and cold start semi-Diesel of the slow-speed type seemed likely to accompany it, leaving only the high-speed Diesel engine. From a weight point of view, the difference was rather amazing. An engine of the old cold start, slow running, oil engine type, running at 300 r.p.m., and developing 100 h.p. would weigh, approximately, 6 tons, of which a high percentage was cast iron, but now an equivalent h.p. could be obtained with material weighing approximately one ton. This was without considering highly specialised cases of weight per h.p. reduction, such as aero engines. In other words, a potential user of 100 h.p. now acquired a machine weighing one ton of which not a high proportion was cast iron as against his previous machines of 6 tons mostly cast iron.

The use of alternative materials to cast iron was extending considerably. The founder, who previously catered for the medium motive power demand, had had his market considerably restricted and had had to face the competition of other materials. The remedies open to the founder were either to extend his activities to the competing materials, or to improve his product and methods of production to compete efficiency with those materials. With regard to the second alternative, to improve the product was a slow process nowadays. Numerous engineers were of the opinion that cast iron had reached the limit of its development so far as ordinary physical properties were concerned. When a casting was machined it must not show gas holes, draws, porous spots, sand, and other refractory inclusions, because every casting rejected in machining or water testing meant another subscriber to the theory that a sound and homogeneous iron casting was a fortunate but unusual happening.

Chemical Theory of Dyeing

Effect of pH Values on Combining Capacity of Dyes

As a contribution to the chemical theory of dyeing, Hsiao and Wilson have recently studied the effect of the *pH* value on the combining capacity of hide powder for acid and basic dyes ("J. Amer. Leather Chem. Assoc., 1932, *27*, 500). Previous investigators have put forward much evidence in support of the chemical theory, although little relationship has been shown between the weight of fibre and that of the dyestuff with which it is capable of combining. In the present investigation, particular attention is paid to the effect of the *pH* of the dye liquor in the fixation of an acid dye (metanil yellow) and a basic colour (methylene blue) by collagen—the protein constituent of hide as typified by American standard hide powder. Hide powder (1 gm.) was immersed in 250 c.c. of the dye solution at known concentration and *pH* for 45 minutes at 55° C. The *pH* of the used liquor was then taken, and the uncombined dyestuff determined volumetrically with titanous chloride. Owing to the amphoteric nature of collagen, it is reasonable to suppose that the extent of dye fixation would be governed by the *pH* of the surrounding media, and this has been found to be so. With methylene blue, fixation increases with increase in *pH* especially after *pH* 5.1 is reached prior to which the collagen is positively charged. Conversely, and as expected, the fixation of metanil yellow increases with decrease in *pH*.

Dyestuff-Collagen Combination

At a definite *pH* (5.83) combination of dyestuff increases with increase in concentration of the dyebath up to 100 mgms. per 100 c.c., when 40 to 41 mgms. methylene blue per 1 gm. collagen is fixed. Temperature also influences the dyestuff-collagen combination, using metanil yellow at *pH* 4.9, there was little dyeing below 25° C., while at 70° C. the collagen tends to lose its fibrous structure. Between the range 35° to 55° fixation appears to be little influenced by temperature, except that a curious dip is noticed in the combined dye/temp. curve between 40° to 50° C. The effect of adding sodium sulphate to the dyebath is to retard the fixation of both acid and basic dyestuff, but with the production of more level shades.

It is stated that the results obtained are in agreement with those expected from an amphoteric substance such as collagen, and also from a consideration of the Donnan effect. At the appropriate *pH* the same number of equivalents of the two dyes enter into combination with the collagen molecule, pointing to the stoichiometric nature of the reaction. Completeness of the reaction might be interfered with by the colour lake forming on the surface of the collagen fibre. Stoichimetric relationship could be best shown if acid and basic dyes were compared at the same limiting *pH* value, in which direction further work is necessary.

Sulphuric Acid Manufacture

The Gaillard Tower Chamber Process

OF the total of twenty-one sulphuric acid chamber plants which have been adopted by the Gaillard tower no fewer than 16 are located in France, Belgium and Spain, Great Britain only being represented by one unit. This estimate, however, does not include the numerous manufacturers who have appreciated the system to the extent of inserting a Gaillard tower between the Glover tower and the first lead chamber.

According to the "Chemiker-Zeitung," of December 7, it is computed that about 1,000 tons or 53° Be sulphuric acid per day are being produced by the Gaillard process, the outstanding advantage of which is the prevention of corrosion of the lead walls by the action of nitrosyl sulphuric acid at an elevated temperature. This action—which is notoriously the chief factor in the breakdown of lead chambers—is avoided with the aid of an automatic acid distributing device in the roof of the chamber from which cold chamber acid is uniformly dashed against the walls of the chamber. Not only are the latter thereby kept at a sufficiently low temperature but a further advantage is gained in the shape of prevention of formation of chamber crystals. In France and Belgium the Gaillard tower has achieved exceptional popularity in connection with the manufacture of ammonium sulphate and superphosphate fertilisers which call for an acid of rather lower concentration than that provided by the ordinary chamber process. The relatively low concentration of the Gaillard sulphuric acid is a point in favour of the process.

Rayon Developments

Manufacture in the Soviet Union

IN the Soviet Union considerable attention is being devoted to the production of artificial silk. The aim is to produce in 1933, 11,000 tons of all kinds of artificial silk (viscose, nitro-silk and vistra). By 1934 the output is estimated to reach 34,348 tons and by 1935, 55,000 tons, according to recent advices from that country. Serious attention is also being paid to the production of artificial soles for shoes from viscose. It is understood that experiments in the manufacture of this kind of sole have been satisfactory and the soles have proved quite hard-wearing. As many as 3,000 pairs of shoes have been made with this artificial sole. The industry is now being extended to be capable of turning out 3,000,000 soles a year.

According to a survey which appears in the "American Silk and Rayon Journal," rayon now occupies third place in Japanese exports. The commerce Ministry has sanctioned the establishment of rayon yarn exchanges in Tokyo and Osaka which will now supplement the established exchange in Fukui.

With Japan's annual output of rayon yarns aggregating considerably over 50,000,000 lb. it is expected that Japan will now actively enter foreign markets into which it has never before ventured. Exports of American rayon yarns to the Latin American market have been increasing slowly but steadily.

Italian domestic consumption of rayon during 1931 totalled 12,000,000 kilos, as compared with 10,000,000 kilos in 1930. Apparently owing to the heaviness of the other textile industries, domestic consumption was not maintained during the first quarter of 1932. Rayon production during the first three months of 1932 totalled 8,836,697 kilos, an increase of 42 per cent. over the first quarter of 1931. Exports have been well maintained and, together with rayon waste, totalled 5,111,480 kilos for the first quarter of the year as compared with 5,025,340 kilos during the same period of 1931.

The decline in the production of the French silk manufacturing industry in recent years has given rise to claims in many quarters that rayon is tending to destroy the silk industry. The ratio of French exports of rayon and rayon fabrics to silk and silk fabrics was 9 to 115 in 1926, 9 to 21 in 1929, 9 to 16 in 1930, and 9 to 8.6 in 1931. In Lyon and the vicinity (the centre of silk weaving), at least 75 per cent. of the looms are working on rayon instead of silk, according to trade sources.

Manganese Dioxide Preparation

Electrolysis with Alternating Current

A METHOD for the preparation of manganese dioxide (MnO_2) by means of electrolysis with alternating current is quoted in "Galvanic and Storage Batteries," an international trade journal for the battery industry, from the Journal of the Society of Chemical Industry, Japan. The analysis was by Naoto Kameyama and Hiroshilida, of the Tokyo Imperial University.

When an aqueous solution of a manganese salt, such as sulphate or nitrate, is electrolysed with alternating current instead of direct current, manganese dioxide can easily be precipitated. Both electrodes are of platinum, the current density of which is kept as high as 5 to 10 amps. per sq. cm. In the bath is an aqueous solution of a manganese salt, say the nitrate (concentration of divalent manganese is about 3 per cent.) with 2 to 3 per cent. nitric acid in it. The temperature is maintained at about 40° C. As the electrolysis proceeds the precipitate of manganese dioxide formed round the electrodes soon settles on the bottom. The precipitate is separated and dried in a range of temperature of about 100 to 120° C. The manganese dioxide is of high purity. The equation for the reaction is as follows:—

$$Mn(NO_3)_2 + 2H_2O = MnO_2 + 2HNO_3$$

If powdered manganese carbonate ($MnCO_3$) is added to neutralise the nitric acid formed the concentrations of manganese nitrate and nitric acid can be kept almost constant, and manganese dioxide can be got continuously from manganese carbonate.

It is already known that the characters of a dry cell are dependent on the properties of manganese dioxide, both chemical and physical, so its method of preparation is of importance. The dry cells made with MnO_2 prepared by a.c. electrolysis of $Mn(NO_3)_2$ have much longer life than dry cells of which the depolariser is the natural MnO_2. It is of interest that some additional agents, such as CrO_3, have a good effect for such uses, when introduced into the electrolysing bath.

Bichromates in Fur Dyeing

Simultaneous Tanning Effects

IN the dyeing of furs, aromatic phenols, amines and aminophenols are used, which although not dyestuffs themselves, are transformed into such by oxidising agents, the most common oxidising agent being hydrogen peroxide. The organic bases, such as resorcine, phyrogallol, aniline, *o*-aminophenol, *m*-toluene diamine, *p*-phenylene diamine, etc., are generally used in admixture, and are sold under the trade names of Ursols, Furranols, Furramines, etc. Dyeing is carried out on both mordanted and unmordanted tanned furs, but usually the fur is mordanted with chrome, copper, iron, aluminium and nickel salts and bichromates. In practice the widely used solutions are:—

(*a*) Potassium bichromate	1.0 gm.	per litre
Potassium tartrate	0.2 gm.	,, ,,
Copper sulphate	0.1 gm.	,, ,,
(*b*) Copper sulphate	4.0 gm.	,, ,,
30 per cent. acetic acid	2.0 cc.	,, ,,
(*c*) Ferrous sulphate	4.0 gm.	,, ,,
30 per cent. acetic acid	2.0 cc.	,, ,,

The objects of mordanting are to form an insoluble compound with the oxidised colouring matter and to render the dyestuff resistant to washing. According to an investigation by Dohogne and Rezabek ("Cuir Tech., 1932, *21*, 349), there is a double effect where bichromate is used. In the first place, there is an oxidising action on the organic base used for dyeing, and secondly there is a combination of the chrome salt formed with the coloured oxidation product.

The first point has been studied, using Ursol fur dyeing bases, and it has been found that the reducing power of these products varies considerably, but a large number can be looked upon as strong reducing agents. It is further shown that the chrome salt formed as the result of reduction has tanning properties, and will bring about a chrome tannage. Hence, some of the fur dyeing bases could be used for a simultaneous tanning and dyeing if used in conjunction with bichromates.

Striving for the Perfect Printer's Ink

Present Lack of Colour Fastness

IN a lecture to the Manchester Section of the Oil and Colour Chemists' Association, on December 9, in the College of Technology, on "The Manufacture of Modern Printing Inks and their Application," Mr. G. F. Jones expressed the view that they might look forward to the gradual attainment of the perfect printer's ink. The printer, he said, defined colour fastness as something which would not materially change after three months' exposure to summer sunlight and he preferred a slight darkening to a slight bleaching. That standard made it difficult for the ink maker to classify his inks correctly. It was amongst the reds that the greatest fading difficulties were met and mostly at the blue end of the range. When they asked for a fast geranium or crimson there was always some detracting feature. Scarlet 3B gave a fast enough geranium but the lake had poor colour strength for modern requirements; Rubine BK, on the other hand, had all the tinctorial value, brilliancy and finish one could desire but there were grave doubts as to its fastness.

For testing light fastness a method was to print on coated and uncoated paper, which was then exposed for a period of three months. Although variable human factors in the production of the prints were encountered, in practice the method gave valuable direct information.

The ink maker had to encounter the actions of various chemical agencies in the application of his inks, such as the resistance to alkali in the strawboard used in mounting show cards and in the soap which was enclosed in printed paper wrappers. Then there was the resistance to sulphurous fumes emanating from match head composition, for the inks intended for printing the labels for match boxes. The foodstuffs industries brought further difficulties, the demands being chiefly on the score of freedom from ingredients harmful to the human body. Anyone could make printing ink to a given formula but it required a technique born of scientific training and experience to make adjustments to that formula to meet varying conditions.

The printing ink maker of to-day was making full use of industrial research not only in his own laboratories, but also by taking his place in the organised research associations. Of necessity the industry was highly specialised and at times somewhat conservative, but he was sure it would come as a surprise to many people to know how much ink manufacture had advanced.

As to the future, oil-water emulsions and cellulose ester combination lacquers were finding applications, though the field was much more restricted than in the paint industry because of printing process limitations. Mr. Jones believed it would be many a long year before the heat thickened oil varnishes were superseded by any other medium for general purposes.

On the colour side there was a tendency nowadays for the ink maker to obtain his pigment, dye or lake in as concentrated a form as possible and then add his own bases or extenders at the time of grinding. From the manufacturer of those pigments they looked for greater strength, brilliancy and fastness to light.

Conference on the Swelling of Proteins

Leather Trades Chemists meet in London

THE British Section of the International Society of Leather Trades' Chemists held a conference on "Protein Swelling and Allied Phenomena" on December 1, at the Leathersellers' Hall. It was opened by Mr. C. N. Latter, Master of the Leathersellers' Company. Mr. F. C. Thompson, president of the International Society of Leather Trades' Chemists and of the British Section, took the chair. In the morning, he said, the conference was the first of its kind held by the Society. The idea of holding it arose from a suggestion by Dr. C. H. Spiers that such meetings on subjects of general interest were greatly desirable, and the subject of protein swelling was chosen on account both of the importance of the work of Proctor and Wilson from the leather chemists' point of view and from its general interest; also because such work was really done under the auspices of the Society. Such conferences as the present one would be held biennially, in those years intervening between the regular biennial general conferences of the Society.

Professor F. G. DONNAN, who had known Proctor, made some observations on the theory of membrane equilibria and the osmotic swelling of protein gels. The simplest case of a membrane equilibrium, he said, was that of the ordinary osmotic equilibrium of a two component system, and the equations for the osmotic pressure in this case were briefly considered. These equations varied according as to whether one considered ideal solutions of any concentration, dilute or very dilute ideal solutions, non-ideal solutions of any concentration, and dilute or very dilute non-ideal solutions. The general equations for the membrane equilibrium of a pair of oppositely charged monovalent ions were considered and he discussed solutions of any concentration and dilute solutions. He also touched upon points connected with the Proctor-Wilson theory of osmotic swelling of protein gels and the difficulty of applying this theory quantitatively to close packed micellar systems such as occur in natural fibres and skins.

Speaking on protein swelling and molecular organisation, Dr. DOROTHY JORDAN LLOYD said that gelatin jellies swell in inverse proportion to the logarithm of the concentration of the gelatin in the jelly at setting. Protein fibres such as muscle fibres, collagen fibres, keratin fibres and silk fibres showed a swelling capacity inversely proportional to the concentration of protein in the fibre, *i.e.*, to the compactness of the fibre-structure. This reduction in swelling power with increasing compactness of molecular organisation was attributed to (1) a reduction of the space available for the diffusion of non-colloidal ions leading to a mechanical restraint on their movements; (2) a reduction of the number of charged centres on the colloidal ion through the formation of cross linkages between the protein molecules; (3) an increase in the rigidity of the protein due to the formation of covalent cross linkages. All these factors would act together to reduce the unequal distribution of diffusible ions (Donnan equilibrium) which was the primary cause of protein swelling in acid and in alkaline solutions.

Mr. W. R. ATKIN, speaking on the swelling of proteins in weak acid, said that much confusion had arisen in the study of swelling by weak acids owing to the neglect of elementary precautions. Most workers had used gelatin containing considerable amounts of ash capable of neutralising acid. External acid solutions specially when dilute, were therefore considerably altered in *pH* by the partial neutralisation and consequent buffering. It was imperative to measure the equilibrium *pH* of any external acid solution. It was also shown that gelatin swollen in weak acids and then transferred to a dilute solution of sodium chloride acquired a positive Procter Searle value, *i.e.*, free hydrochloric acid was developed. It was suggested that a similar mechanism of protein, weak acid and salt may be responsible for the free hydrochloric acid in gastric juice.

Papers were read by Mr. G. S. Adair on "The Osmotic Pressures of the Proteins"; by Dr. H. Phillips on "The Formation and Constitution of Protein Salts from the standpoint of modern theories of Valency"; by Mr. F. C. Thompson on "The Effect of Neutral Salts on the Swelling of Gelatin"; by Dr. R. H. Marriott on "Swelling in Alkaline Solutions"; by Dr. C. H. Spiers on "Practical Aspects of Plumping of Hide and Skins"; by Dr. J. B. Speakman on the "Structure of Wool Keratin and its Relation to Swelling Phenomena." Dr. R. H. Pickard, president of the Society of Chemical Industry, presided in the afternoon.

British Celanese, Ltd., v. Courtaulds, Ltd.

Judgment Reserved Until Next Sittings

ON December 15, in the Chancery Division, Mr. Justice Clauson resumed the hearing of the action in which British Celanese, Ltd., of Celanese House, Hanover Square, W., claimed an injunction restraining Courtaulds, Ltd., of St. Martin's-le-Grand, E.C., from infringing certain letters patent and damages and other relief. Defendants denied having infringed the letters patent and pleaded that they were invalid and counter-claimed for their revocation.

Sir Arthur Colefax, K.C., Mr. Craig Henderson, K.C., Mr. E. J. Neep, and Mr. H. D. Russell Clark appeared for the plaintiffs, and Mr. J. Whitehead, K.C., Sir Stafford Cripps, K.C., Mr. T. Watson, K.C., and Mr. G. W. Tookey for the defendants. Mr. L. F. Heald held a watching brief for the Cellulose Acetate Co., Ltd.

Dealing with common knowledge alleged by the defendants, Sir Arthur Colefax asked what common knowledge was referred to. This was a case in which the art in question was not being practiced in this country at the date of the patent at all and therefore common knowledge of the ordinary kind did not exist. It was agreed it was common knowledge that evaporative air was used, but not warm air. The plaintiffs had developed this as the evaporative medium of warm air and used it in association with the cells and by that means they bore the true interpretation of the methods used. The temperature which was in fact used was 25° C. An endeavour had been made to suggest that because of the pressure used in the nitro silk industry the viscosity of the dope was something quite different from the viscose of the dope if they were using cellulose acetate. His submission was that that was a fallacious conclusion and fallacious reasoning. The process of nitro production never found any industrial use and was a moribund industry in 1921.

Sir Stafford Cripps said he knew a great deal about nitrocellulose as he had been responsible for the boiling of thousands of tons of it.

Question of Anticipation

On the question of anticipation, Sir Arthur Colefax dealt with Clark's patent of 1887 and argued that it could in no way be said to be an anitcipation of plaintiffs' patents. It was not concerned with the material plaintiffs claimed. Then again, Clark's was not an evaporative process.

With regard to Birsch, Sir Arthur challenged that it was an anticipation in any shape or form of plaintiffs' process. There was no evidence that one could carry out what was described by Birsch. Nobody had done it up till now. It was simply a book by Birsch and there was no evidence that a single ounce of silk had been produced by the process. These documents were only published knowledge and not common knowledge, and that was an important point to be borne in mind.

On Friday, Sir Arthur submitted that it was a preposterous idea to suggest that Birsch in his patent was describing a process in which what one got was something not intended to be used, but to be the starting point of a wet coagulated process identical with that by which viscose silk was in fact obtained. That was not what Birsch described. What he described suggested that he had got a viscoid which he said was cellulose as the result of a process which he described. Nothing before the Court showed the possibility of carrying Birsch out.

Next Sir Arthur dealt with a German book which contained extracts of patents and specifications and argued that those which had been quoted contained no spinning in an enclosed casing and there was no evaporation by warm air. He suggested that there had been an endeavour to put into words something which the words did not mean. There was no suggestion at all of using warm air as an evaporative medium. The only suggestion was that air should take the place of water which served in co-operation with the rotation of the jets to catch the thread.

His lordship asked Sir Arthur if the Court were to shut its eyes to the fact that this was a living art in which patents were being taken out frequently, and in which there had been great activity.

Sir Arthur submitted that the Court must first ascertain the invention from the specification, whether there was novelty and then the Court would read the alleged anticipation in the light of common knowledge. There was something here which prior documents had never disclosed. If the Court did not find anticipation and found novelty, it would be loth to reach a decision that there was not subject matter. It seemed to him (Sir Arthur) that the basis of patent law was just the same good sense as any other part of our law.

Novelty in Application and Result

Proceeding, counsel said he was going to submit that the use of the cap spinning device as in the plaintiffs' second patent was a use for a new purpose and in a new manner. There was novelty in the application of the device and in the result. There was novelty in applying the device to a material of a nature different from any which it had previously been applied and secondly the material was not analogous to anything to which the device had been previously applied

Therefore there was a different purpose here—in fact they were using the device not for spinning, but for "throwing." Further it was running at speeds considerably higher than experienced before the filaments were applied continuously with their production to an already rotating bobbin, which again was novel. It was also used to produce a new product, *viz.*, a dry spun twisted material not previously parallel wound, and one which had not suffered prejudicially from the handling involved in the two step process of winding previously practised. Moreover there was novelty in obtaining a smooth twisted dry spun product twisted and wound simultaneously within the cap spinning device. The process was a wonderful one and extremely fascinating to watch. His contention was that there was considerable invention in the cap spinning device and abundant subject matter in the patent.

Judgment Reserved

On Monday, Sir Arthur Colefax reviewed at length the evidence given.

In dealing with the plaintiffs' cap spinning device he characterised the prior documents put forward by the defendants as engendered by hope rather than by knowledge. He submitted that there had been no analogous user of such a device even in the textile industry, and before it was used by the plaintiffs, for their purposes, there was no cap spinning machinery which could be utilised in conjunction with the dry spinning process. He also contended that there was here a wealth of invention and subject matter on the device the plaintiffs had put forward and that the patent was a valid one.

At the close of counsel's speech his lordship said, "I shall hope to deliver any judgment at a future date, but it will not be these sittings."

The hearing of the case has occupied the attention of Mr. Justice Clauson for 34 working days. The speeches of counsel in opening the plaintiffs' and defendants' cases and the summing up on behalf of defendants and plaintiffs, took 13 or 14 days and the examination of expert and other witnesses occupied the rest of the time. Five King's Counsel and five junior counsel were engaged in the case. The questions and answers put to the witnesses numbered just under 13,000.

Professional shorthand writers have worked throughout the hearing and the whole of the proceedings have been transcribed and printed each day, copies being supplied to the Judge, counsel, and expert witnesses and the solicitors engaged in the case.

It is estimated that the case has cost some £40,000.

THE presence of phosphate on Christmas Island, an isolated rocky island about 200 miles south of Java belonging to Great Britain, was first discovered about 1887 and commercial operations were commenced about 10 years later. Early operations were very crude but constant improvements have eliminated most of the labour and the mining company has shipped between 100,000 and 150,000 tons annually in recent years, with reserve facilities for much larger quantities.

Letters to the Editor

The Editor welcomes expression of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

Academical Analysis

SIR,—Your correspondent, A.I.C., says nothing about the students, to whom the teacher, whether he be in a technical college or elsewhere, owes his first duty. They should be considered long before any attention is directed to "extra guineas." If any institution allows a teacher to take extra work, whether he does it unknown to the authorities, or with their connivance on a fifty-fifty basis, the interests of the students are sure to be neglected. It cannot be otherwise. While a teacher is engaged on work for which he will get some extra remuneration, he cannot be attending to his students, who are probably consigned to assistants or left to their own devices.

Students see what is going on. A friend of mine, some years ago, quickly perceived what the head was up to. The students were doing a lot of donkey work, and the head was pocketing the remuneration. My friend, like many other students, was somewhat short of the needful, so he skilfully concocted an advertisement in an appropriate paper, and he managed to attract some work, which he did in the laboratory he was attending. The supervision was such that he carried on a remunerative side line on the college premises, using their apparatus, gas and reagents, without challenge. The circumstances under which he did it were exceptional, but he was quick enough to seize the opportunity, having got his idea from what the head was doing.

Another man I knew was working in a physics laboratory. He noticed that the demonstrator left the students to their own devices, and got on with some private work of his own. This happened so persistently that my friend on one occasion remonstrated with the demonstrator for his inattention, and to press his verbal arguments home, clouted his head. He told me that he felt that the students were being neglected, hence he made his protest.

The "larger whales," to use A.I.C.'s expression, are those over whom there is little or no supervision, and if they indulge in private work during their time on the premises, I am sure they are not carrying on the supervision which they are paid to do. I personally came across a case, in which one of them at regular intervals shut himself in his room, being unapproachable by his subordinates, and earned remuneration during the time he was paid by his committee for doing what he was not doing. It was common scandal what he was doing, and what he was getting for it. It often happens that a good salary does not prevent a man from grasping after a little more. I have been told of many cases of teachers doing work during their official time. I feel sure that it could only be done by the students being neglected.

It is common for a council to prohibit an official from undertaking any other work while in its employ. If a council wants to ensure that its medical officer of health or its engineer, who are more professional than teachers, should have no distractions while in its service, it is equally advisable in the case of teachers. I am quite aware of the plea about "keeping in touch with industry." It could equally be urged in the case of the engineer. It is only a plea for people employed in an occupation in which they have great security of tenure to make a bit more than their official salaries. There is the proverb about the man and the two masters. You cannot have a man who is employed to teach looking after side lines for "extra guineas" at the same time, unless his teaching suffers. It would be advisable in all educational establishments to ensure that the whole of the staffs, including the "larger whales," who are the more likely sinners, shall devote themselves to their duty of teaching. I have confined myself to the students' interests. If a "neighbouring firm" sends in "test work," can A.I.C. ensure that some student is not put on to do it? Did not Squeers send a boy off to weed his garden?—Yours faithfully, S.

Fashion in Chemical Research

SIR,—I have been reading with an interest akin to delight Professor H. E. Armstrong's articles in your paper on "The Institutes of Chemistry." The subject referred to in the title leaves one cool, if not altogether cold, but the rather pithy criticism of the modern tendency to dignify heavy notions with the name of theories, whilst straying hopelessly in the blind alleys of dialectics, appeals to me susceptibly. When I first heard Professor Armstrong's name mentioned back in the '80's, I was studying under the late Professor P. J. Cleve, at Upsala, and both of the professors were tackling dichloronaphthalenes, then a most important theoretical issue. To my unsophisticated mind this tacking on of various tapeworms to the corners of polygonic existences appeared very insignificant, but I should not say that I got a clear idea "How Dan'l jumped," though I certainly saw how he *might* jump. Still, as long as the chemical formulæ are allowed to remain what Berzelius intended them to be—aids to memory or a system of bookkeeping—all is well. Let us admit that we have never, and probably never shall evolve a theory of chemistry which will satisfy the logical definition of such a theory, *viz.*, a complete system of the laws governing the behaviour of any possible combinations of matter under any possible external conditions. All our efforts must be tentative, but some are permissible as stimulating the growth of science. Others are or should be impermissible as stimulating conceit, self-sufficiency and a waste of intelligence.

Now, I agree with Professor Armstrong that we used to be fed on a diet of permissible theories, and that this diet is now out of date. Still, there is a certain amount of permissible stuff in even some of the very latest, but unfortunately that part is generally old. To cite an example, take Bohr's spectrometric theory of the elements. Why does it agree with facts? From the simple reason that Bohr started with what I like to call Rydberg's binomial. The facts are briefly as follows: Rydberg began in the 80's to subject a list of the wave-numbers for the lines of the hydrogen spectrum to an exhaustive algebraical analysis, and found a general expression for any of those wave numbers, consisting of a constant R, divided by a binomial, which for hydrogen was quadratic. This happened at Lund in Sweden, a few hours' journey from Copenhagen, where Bohr's theory saw light many years later. The useful part of Bohr's efforts consists in his further development of Rydberg's binomial and its application to all other elements, but as for the orbital theory of electrons and the modified Rutherford atom—the less said at present, the better. We owe this all-embracing notion to the fact that Rydberg had the good taste to use wave-numbers instead of wave-lengths as Balmer did.

Similarly the notion of relativities is old, even proverbial, and much of Einstein's work may survive, although I doubt whether human reason will ever get a clear idea of a finite universe. Still, was there anything less alarming in the "isomeromania," "neo-elementitis" and "novo-reacteitis" of yore than in the "electronomania" and the "ionomania" of to-day? All these "new" issues are the logical consequence of the atomic theory expanding into a general corpuscular theory, and of extending it to the "imponderables." They are all unreasonable, as matter must be infinitely divisible, and a universe, consisting of innumerable identities of a few kinds, is without parallel in what we can conceive with our senses. Everything points towards degree of magnitude of the ultimate particles as being acceptible, with equivalent masses as the only necessary assumption. This was, as we all known, the Berzelian notion during the middle part of his life, though he went back to the atomic notion later on as convenient for dealing with complex molecules, isomerisms, etc.

To Berzelius a clear, easily remembered vision of chemistry

as a whole was a *sine qua non*, but secondary in importance to himself to the augmentation of knowledge of facts, and above all to "clearness and truth" which he used as his motto. I take it that Professor Armstrong has very similar views, and that he feels himself called upon to warn the speculative theorists of to-day against the farcicality of the wax in "their Ikaros wings, when subjected to the rays of the sun of the truth," as Berzelius did at the meeting of Scandinavian natural scientists in 1845. That he attacks fashion in chemical research, seems to be wasting time and thought on an unworthy subject, but maybe it is useful after all, and I will add another—the phase rule. How many cheap reputations have been made by micro-photography is difficult to estimate, even approximately, but to find a chemical paper or journal without specimens of the art, is almost as difficult. Diagrams of thermal or any other old equilibria are similarly fashionable, but the effect on industrial metallurgy as an example is mainly imaginary, though the fashion has stimulated the makers of pyrometrically controlled furnaces to give us what we wanted years ago.

Perhaps, after all, no effort is wasted, and Professor Armstrong's remarks themselves are only one of Einstein's relativities as to their applicability. One moment you feel you agree with him—the next you don't. One thing only is universally obvious—young chemists of to-day lack serious general education. Half of them cannot hold a pen "like a Christian," let alone write speedily and legibly, and not a few of them think that good English diction is synonymous with avoiding grammatical errors. To be well read means to have skimmed through the works of contemporary celebrities, etc., etc. History and geography have apparently never been popular in England, but their popularity has not increased, nor has that of natural history and so on all round, the cause being that so much time has to be given up to "science" at school! This anomaly has been severely criticised by Professor Armstrong, and I agree with him, but how can it be put right? Not all secondary schoolboys go to a university, and those who do not, must be able to *talk* about "science"! —Yours faithfully,

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Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS. J. Y. Johnson (*I. G. Farbenindustrie.*) April 29, 1931. 384,311.

PROCESS FOR THE MANUFACTURE OF DERIVATIVES OF SOAP-FORMING CARBOXYLIC ACIDS. A. Carpmael (*I. G. Farbenindustrie*). May 23, 1931. 384,314.

INTERMEDIATE PRODUCTS AND AZO-DYESTUFFS THEREFROM. Imperial Chemical Industries, Ltd., and R. F. Goldstein. May 29, 1931. 384,317.

FORMING COMPOUNDS FROM ACETYLENE. W. W. Triggs (*E. I. Du Pont de Nemours and Co.*) May 30, 1931. 384,332.

RESINOUS COMPOSITIONS AND METHODS OF MANUFACTURING THE SAME. British Thomson-Houston Co., Ltd. June 10, 1930. 384,342.

PROCESS AND MEANS FOR TREATING ARTICLES OF WOOD USED IN DYEING, BLEACHING, AND LIKE TEXTILE-FINISHING OPERATIONS TO RENDER THEM ACID AND WATERPROOF. T. Waring. Aug. 31, 1931. 384,369.

TREATMENT OF GASES ARISING IN THE DISTILLATION OR CARBONISATION OF COAL AND LIKE CARBONIFEROUS MATERIAL. C. Cooper, D. M. Henshaw and W. C. Holmes and Co., Ltd. Sept. 25, 1931. 384,388.

PRODUCTION OF AMMONIUM SULPHATE FROM COKE OVEN GAS AND OTHER GASES OBTAINED FROM THE DISTILLATION OF COAL. Cargo Fleet Iron Co., Ltd., and A. J. Caddick. June 22, 1932. 384,392.

PROCESS FOR INCREASING THE AFFINITY OF CELLULOSE ESTERS FOR DYESTUFFS. Lonza Elektrizitätswerke und Chemische Fabriken A-G. Oct. 24, 1930. 384,403.

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MANUFACTURE OF INORGANIC COLOURED PIGMENTS. I. G. Farbenindustrie. Feb. 7, 1931. 384,473.

METHOD OF FREEING COKE OVEN GAS FROM NITROGEN OXIDES AND/OR FOR CONVERTING THE LATTER INTO AMMONIA. H. Tropsch and R. Kassler. April 22, 1931. 384,532.

PROCESS OF MANUFACTURING GLAZES OR ENAMELS. T. Goldschmidt A.-G. Sept. 28, 1931. 384,538.

PROCESS FOR FILTRATION AND STERILISATION OF LIQUIDS. G. Lakhovsky. June 4, 1931. 384,547.

EXTRUSION OF CELLULOSIC PLASTIC COMPOSITIONS. Meigs, Bassett and Slaughter, Inc. March 4, 1930. 384,321.

MANUFACTURE OF CHLOROSULPHONIC ACID. Soc. of Chemical Industry in Basle. Aug. 17, 1931. 384,615.

MANUFACTURE OF AROMATIC OXYCARBOXYLIC ACIDS. Dr. A. Wacker Ges für Elektro-Chemische Industrie Ges. Sept. 9, 1931. 384,619.

PRODUCTION OF SULPHO-CYANIDE COMPOUNDS. E. Hene. May 22, 1931. 384,662.

ACETYLENE REACTIONS. W. W. Triggs (*E. I. Du Pont de Nemours and Co.*) May 27, 1931. 384,654.

POLYMERISATION PRODUCTS OF NON-BENZENOID ACETYLENE POLYMERS AND COMPOSITIOS CONTAINING THE SAME. W. W. Triggs (*E. I. Du Pont de Nemours and Co.*) May 27, 1931. 384,655.

PROCESS FOR THE MANUFACTURE OF AMIDES OF HIGHER FATTY ACIDS. A. Carmael (*I. G. Farbenindustrie*). June 4, 1931. 384,665.

METHOD AND APPARATUS FOR CONDITIONING GASES. W. W. Triggs (*Industrial Dryer Corporation*). June 4, 1931. 384,666.

PROCESS FOR THE MANUFACTURE OF A FOAMLIKE MASS. R. O. Herzog and H. Hoffmann. June 4, 1930. 384,668.

MANUFACTURE OF STABLE ANTIMONY COMPOUNDS. Chemische Fabrik Vorm. Sandoz. June 26, 1931. 384,687.

PROCESS OF PRODUCING SULPHO-ACIDS. Chemische und Seifenfabrik R. Baumheier A.-G. Aug. 6, 1930. 384,701.

TREATMENT OF ARTIFICIAL SILK SPINNING CAKES. Glanzstoff Courtaulds Ges. Aug. 10, 1931. 384,706.

MANUFACTURE OF DYES OF THE ISO-ROSINDULINE AND ROSINDULINE SERIES. E. I. Du Pont de Nemours and Co. Aug. 15, 1930. 384,709.

CATALYTIC PRODUCTION OF AMINES FROM ALCOHOLS AND AMMONIA. E. I. Du Pont de Nemours and Co. Aug. 27, 1930. 384,714.

APPARATUS FOR CARRYING OUT THE MANUFACTURE AND PRODUCTION OF NEUTRAL PRODUCTS FROM OILS AND FATS. J. Y. Johnson (*I. G. Farbenindustrie*). Aug. 31, 1931. 384,715.

MANUFACTURE AND PRODUCTION OF ORGANIC SULPHO-CHLORIDES. J. Y. Johnson (*I. G. Farbenindustrie*). Sept. 14, 1931. 384,722.

REMOVAL OF SODIUM SULPHATE FROM SOLUTIONS CONTAINING SODIUM SULPHATE AND SULPHURIC ACID. Courtaulds, Ltd., and H. J. Hegan. Sept. 19, 1931. 384,726.

EVAPORATORS FOR DISTILLING OR CONCENTRATING APPARATUS. W. C. Mason and W. W. Hutcheson. Oct. 12, 1931. 384,741.

MANUFACTURE OF AZO-DYESTUFFS CONTAINING CHROMIUM. Soc. of Chemical Industry in Basle. Nov. 14, 1930. 384,767.

PRODUCTION OF AZO DYESTUFFS. A. L. Mond (*I. G. Farbenindustrie*). Dec. 10, 1931. 384,800.

SEPARATION OF TITANIUM DIOXIDE HYDRATE FROM HYDROLYSABLE SOLUTIONS OF TITANIUM SALTS. J. Blumenfeld. March 20, 1931. 384,875.

MANUFACTURE OF YELLOW MORDANT DYESTUFFS. W. W. Groves (*Durand and Huguenin A.-G.*). May 12, 1932. 384,901.

SODIUM-HYDROSULPHITE PREPARATIONS. W. W. Groves (*I. G. Farbenindustrie*). May 13, 1932. 384,903.

PREPARATION OF BERYLLIUM COMPOUNDS. Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler. July 31, 1931. 384,926.

PROCESSES FOR THE MANUFACTURE OF CAST EXPLOSIVE CHARGES HAVING A BASIS OF AMMONIUM NITRATE. Dynamit Akt.-Ges. Vorm. A. Nobel and Co. Sept. 29, 1931. 384,966.

Complete Specifications open to Public Inspection

MANUFACTURE OF 3.5-DIIODO-4-PYRIDONE. I. G. Farbenindustrie. Dec. 20, 1930. 33936/32.

Applications for Patents

MANUFACTURE OF DIHYDROXY-FLUORANTHENE AND DERIVATIVES THEREOF. I. G. Farbenindustrie. Dec. 9. (Germany, Dec. 11, '31.) 35000.

STRIPPING AND DISCHARGING DYED TEXTILES. Imperial Chemical Industries. Ltd. Dec. 5. 34397.

PRODUCTION OF POTASSIUM SULPHATE. Imperial Chemical Industries, Ltd. and I. L. Clifford. Dec. 8. 34848.

MANUFACTURE OF SULPHONATION DERIVATIVES OF THE ABIETENE GROUP. Imperial Chemical Industries, Ltd. (*E. I. Du Pont de Nemours and Co.*). Dec. 10. 35090.

PRODUCTION OF NITRATES. K. W. James (*Atmospheric Nitrogen Corporation*). Dec. 5. 34455.

PRODUCTION OF OIL-SOLUBLE RESINS. I. Rosenblum. Dec. 9. (United States, Dec. 11, '31, Feb. 20 and Aug. 11.) 34988, 34989, 34990.

METHODS OF MAKING HEAT-TREATED WHITE CAST IRON, ETC. Allied Process Corporation. Dec. 16. (United States, Dec. 17, '31.) 35692.

SYNTHETIC RESINS, AND COATING COMPOSITIONS CONTAINING SAME. T. F. Bradley (*American Cyanamid Co.*). Dec. 14. 35424.

PRODUCTION OF COPPER FROM ORES, ETC. E. A. Ashcroft. Dec. 13. 35332.

MANUFACTURE OF METAL SULPHATE SOLUTIONS FROM METAL-BEARING MATERIALS. E. A. Ashcroft. Dec. 13. 35333.

EXTRACTION OF METALS FROM ORES, ETC. E. A. Ashcroft. Dec. 13. 35334.

ELECTROLYSIS OF ZINC CHLORIDE, ETC. E. A. Ashcroft. Dec. 13. 35335.

TREATING METAL-BEARING PRODUCTS FOR CHLORIDISING, ETC. E. A. Ashcroft. Dec. 13. 35336.

PREPARATION OF BERYLLIUM. Compagnie de Produits Chimiques et Electro-métallurgiques Alais, Froges, et Camargue. Dec. 12. (France, Dec. 19, '31.) 35156, 35157, 35158.

RECTIFICATION OF ALCOHOL. H. M. Guinot. Dec. 17. (France, Jan. 11.) 35854.

PHOTOGRAPHIC PLATES, ETC. I. G. Farbenindustrie. Dec. 15. (Germany, Dec. 15, '31.) 35568.

SENSITISING PHOTOGRAPHIC SILVER HALIDE EMULSIONS. I. G. Farbenindustrie. Dec. 15. (Germany, Dec. 15, '31.) 35586.

MANUFACTURE OF AQUEOUS SOLUTIONS OF AMINOACRIDINE SALTS. I. G. Farbenindustrie. Dec. 16. (Germany, Dec. 16, '31.) 35701.

SENSITISING SILVER-HALIDE EMULSIONS. I. G. Farbenindustrie. Dec. 16. 35703.

MANUFACTURE OF AZO-DYESTUFFS. I. G. Farbenindustrie. Dec. 16. (Germany, Dec. 18, '31.) 35766.

DYESTUFFS. Imperial Chemical Industries, Ltd. Dec. 12. 35150.

ANTHRAQUINONE LACTAM DYESTUFFS. Imperial Chemical Industries, Ltd., S. Ellingworth, N. H. Haddock, and C. H. Lumsden. Dec. 14. 35445.

PROCESS FOR IMPROVING LUBRICATING OILS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 12. 35171.

ADDITIONS FOR LUBRICATING OILS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 12. 35173.

MANUFACTURE OF HIGH MOLECULAR HYDROGENATION PRODUCTS OF RUBBER, ETC. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 12. 35172.

MANUFACTURE OF RESINS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 12. 35174.

CARRYING OUT CATALYTIC REACTIONS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 12. 35175.

SURFACE IMPROVEMENT OF IRON, ETC. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 12. 35176.

IMPROVING OILS CONTAINING PARAFFIN WAX. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 13. 35329.

HYDROCARBON MIXTURES HAVING LOW SETTING POINT. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 13. 35330.

REMOVING PARAFFIN WAX FROM OILS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 13. 35331.

MANUFACTURE OF DYESTUFF MIXTURES. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 14. 35428.

PROCESS FOR IMPROVING HYDROCARBON MIXTURES. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 15. 35555.

MANUFACTURE OF LUBRICATING OILS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 15. 35556.

APPARATUS FOR MANUFACTURE OF SULPHUR. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 15. 35557.

MANUFACTURE OF CARBON PREPARATIONS. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 17. 35835.

PRODUCTION OF BLEACHING POWDER. A. L. Mond (*I. G. Farbenindustrie*). Dec. 17. 35865.

PRODUCTION OF CORROSION-RESISTING COATINGS ON ALUMINIUM, ETC. Siemens-Elektro-Osmose Ges. Dec. 12. (Germany, Dec. 10, '31.) 35223.

MANUFACTURE OF AZO DYESTUFFS. Soc. of Chemical Industry in Basle. Dec. 14. (Switzerland, Dec. 17, '31.) 35446.

ALUMINIUM BASE ALLOYS. A. H. Stevens (*Aluminium, Ltd.*). Dec. 14. 35448.

New Companies Registered

British Hydrogenation, Ltd., 28 Grosvenor Place, S.W. Registered as a "private" company on November 23. Nominal capital £1,000 in £1 shares. To carry on the business of the hydrogenation of oils produced from the carbonisation of coal, and that of distillers of coal and coal products, gas makers, oil distillers and refiners, tar, dye and chemical manufacturers, refiners, and producers of petroleum, petroleum products, oils, hydrocarbons, etc.

British Nitrogen Engineering, Ltd., 45 Bloomsbury Square, London, W.C.1. Registered as a "private" company on December 14. Nominal capital £100 in £1 shares. Analytical and manufacturing chemists, chemical engineers, manufacturers and importers of and dealers in fertilisers, synthetic ammonia, manures, chemicals, etc. Directors: F. Le Neve Foster, and T. Swan.

British Sidac, Ltd., 8 Fredericks Place, London, E.C.2. Registered on December 6. Nominal capital £100 in £1 shares. Objects: to adopt an agreement with H. W. Garnett, the liquidator of Nuera Art Silk Company, Ltd., (in voluntary liquidation), and two agreements with Société Industrielle de la Cellulose, and to carry on the business of manufacturers of all kinds of hygienic wrapping papers, made from cellulose or acetate, or any other raw materials, paper mill owners, paper and pulp manufacturers, artificial silk merchants and manufacturers, chemical, vitriol, bleaching and dyeing material manufacturers, etc. Subscribers: G. W. Treadwell, 46 Jerningham Road, S.E., and J. N. L. Isaac.

Impag (London), Ltd., 10 Lloyd's Avenue, London, E.C.3. Registered as a "private" company on December 19. Nominal capital £10,000 in £1 shares. Merchants, dealers in produce, raw materials, foodstuffs, oil seeds, fats, rubber tanning materials, silk wood pulp, cellulose, paper, machinery, electrical plant, fertilisers, chemicals, etc. Directors: J. Steiner and R. Wiskemann.

Irish Radium Products, Ltd. Registered as a "private" company in Dublin on December 17. Nominal capital £10,000 in £1 shares. Manufacturers and producers of and dealers in blacking, polish, paint, varnish, lacquer, enamel staining, creosote, tar, etc. Directors: M. S. Green, 1 The Quay, Waterford, J. F. Crowley, N. Walton, E. Ryan, and S. Lord.

James Rudman (Ireland), Ltd. Registered as a "private" company on December 15. Nominal £2,000 in £1 shares. Paint, varnish and glue manufacturers and merchants, oil and colour merchants and manufacturers, drysalters, etc. A subscriber is C. E. Webb, 29 Filton Avenue, Bristol.

Kaycee, Ltd., Thanet House, 231 Strand, London, W.C.2. Registered as a "private" company on December 14. Nominal capital £2,000 in £1 shares. Producers and manufacturers of and dealers in minerals, vegetable gums, chemicals and fabrics, manufacturers of or dealers in chemical plant and machinery, etc. Directors: Olive L. Swaebe and P. H. Head.

South Eastern Gas Corporation, Ltd. Registered December 3. Nominal capital £1,000 in £1 shares. The objects are to acquire and hold interests in any undertaking or company formed to carry on the business of manufacturing or supplying gas, electricity or water; to carry on the business of a gasworks company in all its branches; to deal with, manufacture and render saleable coke, coal-tar, cannel, creosote and other residual products obtained in the manufacture of gas, etc. Directors: J. Day, Lavant House, Chichester, and K. W. Hickman.

Thawpit (1932), Ltd., Astor House, Aldwych, London, W.C.2. Registered on November 30. Nominal capital £100 in 1s. shares. Objects: To acquire the undertaking and business of Thawpit, Ltd., including the trade mark "Thawpit," and to carry on the business of manufacturers and importers of and dealers in chemical, cleaning, industrial and other preparations, drysalters, oil and colour merchants, etc. Subscribers: H. E. Skan, 4 Copthall Chambers, E.C.2, and P. H. Brashier.

United Economisers, Ltd., 3-4 Faulkner's Alley, Cowcross Street, London, E.C. Registered as a "private" company on December 10. Nominal capital £100 in £1 shares. Objects: to carry on the business of manufacturers of and wholesale and retail dealers in water softeners and water filters, developers of inventions relating to chemical processes, manufacturers of and dealers in cloth and other cleaners and stain removers, etc. Directors: A. Eddington, Elm Green Farm, Danbury, near Chelmsford, Essex, and K. W. Walker.

Winton Syndicate, Ltd., 21 Great Winchester Street, E.C.2. Registered as a "private" company on November 23. Nominal capital £5,000 in £1 shares. Objects: To acquire, exercise and work an invention and apparatus for producing dense carbon dioxide snow from liquid carbon dioxide or other components or derivative, and whether for the purposee of a preservative, retarding decomposition or disintegration or for chemical or commercial purposes, and to carry on the business of importers, exporters, chemists, drysalters, refiners and manufacturers and distillers of chemical, industrial and other preparations, etc.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

THERE are no price changes in the markets for wood distillation products, perfumery chemicals and intermediates. In London there has been quite a good demand for chemicals generally, with prices very firm. The market for coal tar products remains unchanged. A certain amount of contract buying has been reported on the Manchester chemical market during the past week, but, for the most part, business has been on a seasonally restricted scale, and little in the way of development may be expected now until early in January. In a number of the consuming works in the district extended holiday stoppages are contemplated, and in these instances deliveries will naturally be affected. Price developments have been of little consequence during the week and the tone of the market generally continues very steady. Steady buying is reported in the Scottish chemical market, prompt delivery being an important factor. Annual stocktaking is having an effect on the quantities required.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £37 5s. to £39 5s.; pure 80% £38 5s. to £40 5s.; tech., 40%, £19 15s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech. 40%, £20 5s. to £22 5s.; tech. 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in one-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID CITRIC.—LONDON: 10d. less 5%. MANCHESTER: 10d. to 10½d.

ACID, CRESYLIC.—97/99%, 1s. 5d. to 1s. 7d. per gal.; 99/100%, 1s. 9d. to 2s.

ACID, FORMIC.—LONDON: £52 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s per ton; 50% by weight, £28 10s.; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £20 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £50 per ton in casks, 53s. 6d. to 57s. 6d. per cwt. in kegs. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £52 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations: 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—10d. per lb. SCOTLAND: B.P. crystals, 10½d., carriage paid. MANCHESTER: 10¼d. to 10½d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb. d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £36 per ton; powdered, £38, in 5-cwt. casks d/d U.K. stations or f.o.b. U.K. ports.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £22 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb. according to quality.

ARSENIC.—LONDON: £22 10s. c.i.f. main U.K. ports for imported material; Cornish, nominal, £23 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £24 10s. at mines.

ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 10s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated £15 10s. per ton, power £17, packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 1d. to 3s. 5d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3¾d. to 5¼d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £45 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K. Green 1s. 2d. per lb.

CHROMETAN.—Crystals 3¾d. per lb. Liquor £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r, or ex works.

CREAM OF TARTAR.—LONDON: £4 5s. per cwt.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£46 to £50 per ton.

LEAD ACETATE.—LONDON: White, £34 per ton. Brown, £1 per ton less. SCOTLAND: White crystals, £34 to £36 c.i.f. U.K. ports. Brown, £1 per ton less. MANCHESTER: White, £32 10s.; Brown, £31.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.

LITHOPONE.—30%, £18 to £19 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£54 per ton d/d.

NICKEL SULPHATE.—£54 per ton d/d.

PHENOL.—9d. to 10d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £34. MANCHESTER: £37.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8½d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¼d.; M.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8¼d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £6 per ton f.o.r in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums £18 15s. in casks. Solid 76/77% £14 10s. in drums; 70/72% £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £12 15s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£21 to £22 per ton.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—3¾d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals £15 ex station 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.

SODIUM NITRITE.—Spot, £19 to £22 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£13 per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 6d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums. Crystals Spot £7 15s. per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11 10s.; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £16 10s. per ton f.o.b.
SULPHUR.—£12 per ton. SCOTLAND: Flowers, £12 10s.; roll, £12; rock, £9. Ground American, £12 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 6d. to 4s. 11d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON and SCOTLAND: £12 per ton.
ZINC SULPHIDE.—1s. to 1s. 2d. per lb.

Pharmaceutical and Fine Chemicals

ACID, SALICYLIC.—Technical, 1s. to 1s. 2d. per lb.; B.P., 1s. 7d. to 1s. 10d. LONDON: B.P., 1s. 7d. to 2s. 2d.
AMIDOPYRIN.—19s. 6d. per lb.
BISMUTH.—Carbonate, 7s. 1d. per lb.; citrate, 9s. 7d.; nitrate (cryst.), 4s. 9d.; oxide, 10s. 11d.; salicylate, 7s. 11d.; subchlorate, 10s. 8d.; subgallate, 7s. 7d.; subnitrate, 6s. 1d.
IODINE RESUB., B.P.—15s. 7d. to 19s. 8d. per lb.
IODOFORM, B.P. CRYSTALS.—17s. 9d. to 22s. 9d. per lb. LONDON: 18s. 9d. to 22s. 9d.
LITHIUM CARBONATE, B.P. 1914.—5s. 4d. per lb.
MENTHOL, A.B.R., RECRYST., B.P.—18s. 6d. per lb.
POTASS BITARTRATE 99/100% (CREAM OF TARTAR).—£4 7s. per cwt.
POTASS. IODIDE, B.P.—13s. 10d. to 16s. 4d. per lb.
SODIUM IODIDE, B.P.—14s. 10d. to 17s. 11d. per lb.
SODIUM SALICYLATE.—Powder, 2s. to 2s. 8d. per lb.; crystal, 2s. 1d. to 2s. 1d. LONDON: Powder, 2s. 1d. to 2s. 1d., including packing and delivery; crystals, 1d. extra.
SULPHITE ANHYDROUS.—£23 to £25 per ton.
QUININE SULPHATE.—2s. 6d. per oz.
COUMARIN.—14s. 6d. per lb.
GERANIOL.—6s. 6d. to 11s. per lb.

Essential Oils

BERGAMOT.—8s. 6d. per lb.
BOURBON GERANIUM.—24s. 6d. per lb.
CANANGA, JAVA.—11s. per lb.
CITRONELLA OIL.—Java, 3s. per lb.; Ceylon, 2s. 6d. per lb.
LEMONGRASS.—3s. per lb.
ORANGE, SWEET.—7s. per lb.
PEPPERMINT, WAYNE COUNTY.—14s. 6d. per lb.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—7d. to 9½d. per lb. Crude, 60's 2% water, 2s. per gal. MANCHESTER: Crystals, 7¾d.; crude, 2s. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100, 1s. 7d. to 1s. 8d. per gal.; B.P., 1s. 9d. to 1s. 11d.; Refined, 1s. 7d. to 1s. 9d.; Pale, 98%, 1s. 5d. to 1s. 7d.; Dark, 1s. 2d. to 1s. 3d. London: 98/100%, 1s. 3d. Dark 95/97%, 11d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4¾d. per gal.
BENZOL.—At works, crude, 10d. to 11d. per gal.; standard motor, 1s. 6½d. to 1s. 7d.; 90%, 1s. 7d. to 1s. 8d.; pure, 1s. 10d. to 1s. 11d. LONDON: Motor, 1s. 7½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.
CREOSOTE.—Standard for export, 4¾d. to 5d. nett per gal. f.o.b. for Home, 3¾d. d/d. LONDON: 3d. to 3⅛d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 2½d. to 3¾d. SCOTLAND: Specification oils, 3¾d to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4¼d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160, 1s. 4d. to 1s. 6d. per gal.; 95/160, 1s. 7d. to 1s. 8d.; 90/160, 1s. 1d. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160, 1s. 3d. to 1s. 3½d.; 90/190, 11d. to 1s. 2d.
NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaker, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.
PITCH.—Medium soft, £4 17s. 6d. to £5 per ton. MANCHESTER: £4 15s. f.o.b. LONDON: £4 14s. to £4 16s. 6d. f.o.b. East Coast port.
PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND: 4¾d. to 5s. per gal.
XYLOL.—1s. 10d. to 2s. per gal.; Pure, 1s. 11d. to 2s. 2d.
TOLUOL, 90%.—1s. 10d. to 2s. 1d. per gal.; Pure, 2s. 3d. to 2s. 5d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £8 15s. per ton. Grey £10 10s. to £12. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £1; grey, £12.
ACETIC ACID, TECHNICAL 40%.—£16 10s. to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 to £11 per ton.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The export market for sulphate of ammonia is quiet, but the price remains steady at £5 7s. 6d. per ton for neutral quality, basis 20.6% nitrogen, f.o.b. U.K. port in single bags, for December shipment. For January shipment the price is 2s. 6d. per ton higher. In the home market the price for December delivery is £6 2s. 6d. er ton delivered in 6-ton lots to consumrs' nearest station, and for January delivery it is £6 5s. per ton.
NITRATE OF SODA.—£8 12s. per ton for December and £8 14s. per ton for January, delivered in 6-ton lots to farmers' nearest stations.
NITRO-CHALK.—£7 5s. per ton for delivery up to June next in 6-ton lots.

Latest Oil Prices

LONDON, December 21.—LINSEED OIL was steady. Spot, small quantities, £17 5s.; Jan., £16 15s.; Jan.-April, £17 1s0.; May-Aug., £18 15s.; Sept.-Dec., £19 2s. 6d. per ton, naked. RAPE OIL was quiet. Crude, extracted, £29 5s.; technical, refined, £31 5s. per ton, naked, ex wharf. COTTON OIL was steady. Egyptian, crude, £23; refined common edible, £26; and deodorised, £28 per ton, naked, ex mill. TURPENTINE was firm. American, spot, 62s. 6d. per cwt.
HULL.—LINSEED OIL.—Spot, £17 5s. per ton; Dec., £16 15s.; Jan.-April, £17 17s. 6d.; May-Aug., £18 15s. COTTON OIL.—Egyptian, crude, spot, £23 5s.; edible, refined, spot, £25 10s.; technical, spot, £23 5s.; deodorised, £26 15s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £22, naked. GROUNDNUT OIL, not quoted. RAPE OIL.—Crushed-extracted, spot, £29; refined, £30 10s. SOYA OIL.—Crushed-extracted, spot, £23; deodorised, £26 per ton. COD OIL.—Dec., 18s. per cwt.; Jan., 18s. 6d. CASTOR OIL.—Pharmaceutical, spot, 42s.; first, 37s.; second, 34s. TURPENTINE.—American, spot, 64s. per cwt.

Sulphide Corporation Ltd.

Operations Extended at Seaton Carew Works

THE thirty-sixth annual general meeting of the Sulphide Corporation, Ltd., was held in London, on December 19, when Mr. Andrew Williamson (the acting chairman) said that, in view of the continued world-wide depression, he did not think the shareholders would have been surprised that the corporation had had another year of unprofitable working. It was reassuring to find, however, that despite the adverse result of the last two years' working, the liquid assets of the corporation, after providing for all trade and other ascertainable liabilities, amounted to over £500,000. The net loss of £55,843 was less by £11,826 than that incurred in the previous year, and was carried to the balance sheet, in which it was distributed between accumulated profit account and reserve for contingencies.

As a result of the co-operation of zinc producers, world zinc stocks had been reduced and the zinc industry had shown signs of improvement, the production in 1931 being 1,012,682 metric tons and the consumption 1,061,800 metric tons. Notwithstanding the measures previously taken by lead producers, world lead stocks had increased. The production of lead in 1931 was 1,401,083 tons, and the consumption 1,270,600 tons, so that the production in the case of lead exceeded cosumption by 130,483 tons, indicating the desirability of some concerted action to deal with the position before it became seriously unbalanced. At Cockle Creek, for the first nine months of the year all productive work ceased except that the sulphuric and hydrochloric acid plants were kept in commission to supply local requirements. The demand for cement and superphosphates was much below normal, and although not working to half their capacity, operations at these works had been profitable. At the zinc and chemical works at Seaton Carew, where they had to suspend the smelting of their zinc concentrates, roasting of the concentrates had continued throughout the year, though on a reduced scale. With the object of extending their operations at these works, the company had arranged to produce zinc oxide, and a small scale plant was being erected for that purpose.

From Week to Week

MR. ALEXANDER KENNEDY, of Castlebank House, Anniesland, Glasgow, founder of Castlebank Dyeworks, Glasgow, a director of A. and W. Smith and Co., Ltd., left £45,918.

THE TREASURY has issued an order adding iron bromide and tantalum metal to the free list under the Import Duties Act.

A BILL HAS BEEN INTRODUCED BY THE GOVERNMENT OF TURKEY to establish a state monopoly over the importation of sugar into Turkey from January 1.

MR. S. A. COURTAULD has given £20,000 to be added to the endowment of the Courtauld Institute of Bio-Chemistry of the medical school at Middlesex Hospital to meet current expenses. In all Mr. Courtauld had given £100,000 to the medical school.

THE LECTURE AT THE HUDDERSFIELD section of the Society of Dyers and Colourists on December 13 was Dr. J. B. Speakman, of the Textile Chemistry Department of Leeds University, who spoke on "Recent Advances in Textile Chemistry, with Special Reference to Dyeing and Finishing."

MR. CHRISTIAN HAMILTON GRAY, of Hurst House, Abbey Wood, London, S.E., rubber manufacturer, lately chairman and managing director of Palmer Tyre, Ltd., formerly chairman and latterly joint managing director of the India Rubber, Gutta Percha and Telegraph Works Co., Ltd., who died on October 30, left £107,548.

AT THE GENERAL MEETING of the Swedish Match Co., held at Stockholm on December 15, the decision was confirmed to write down the share capital from 360,000,000 kr. to 90,000,000 kr. by reducing the nominal value of the shares from 100 kr. to 25 kr. each.

MR. J. BEAUMONT PEASE, Chairman of Lloyd's Bank, described some of "The Trials of a Banker" at an Individualist luncheon, at the Hotel Victoria on December 14. "If the banks were nationalised, would the depositors," he asked "be content to leave their money to men who were professedly going to use it for what might be considered wild cat schemes?"

A CONFERENCE was held in London on December 15 arising out of the request of the Miners' Federation to the Mining Association and the Government for national negotiations and discussions for a national settlement in view of the position that may develop when the existing wage guarantees expire next July. The owners agreed to a joint meeting.

MALAYAN RUBBER GROWERS have passed a resolution that it is essential for the prosperity of the country that the rubber-producing industry be placed again on a profitable basis. At a meeting held at Singapore on December 18, it was also resolved that the Government be urgently petitioned to re-open negotiations with the Dutch and other Governments, for the institution of international control on the lines of the scheme recently submitted to Sir Samuel Wilson.

BECAUSE OF THE PRESENT REDUCED DEMAND for textile machinery and in order to realise the full measure of economies which the merger has made possible, the directors of Textile Machinery Makers, Ltd., Manchester, have decided to concentrate for the present the manufacture now being carried on in the works of Platt Brothers and Co., Ltd., Howard and Bullough, Ltd., and Brooks and Doxey, Ltd., and to suspend temporarily the other three works.

CWMFELIN STEELWORKS at Swansea are to be re-opened almost immediately after Christmas, probably on December 28. These works were closed down three years ago, and at that time employed about 1,100 men. Four of the six furnaces are to be relit and some 300 men will be at once absorbed. Some of the rolling mills will be started about a week later when steel is available. The works are owned by Richard Thomas and Co., who use the steel produced for the manufacture of tinplates.

THE ASSERTION THAT THE IRON AND STEEL INDUSTRY on Teeside was extremely well placed commercially to feel the first effects of any world trade revival was made by Mr. S. W. Rawson, secretary and controller of Dorman, Long and Co., at the annual dinner of the Cleveland Iron and Steel Works Ambulance organisation held on December 16 at Middlesbrough. He did not think there was a concern in the whole country which has kept its commercial connections in such a good condition as Dorman, Long and Co., and it was by this connection that they hoped to reap the first effects of any trade revival.

THE IMPORT DUTIES ADVISORY COMMITTEE gives notice of applications for the addition of the following goods to the free list: Ferrochrome; cobalt metal; nickel metal in the form of pellets, cubes, rondels, etc.; refined ferro-manganese, containing less than 3 per cent. of carbon. The Committee further gives notice of applications for drawback under Section 9 of the Finance Act, 1932, in the case of metallic ammunition in respect of the cupro-nickel or gilding-metal coated steel cups used in its manufacture, and hollow mining drill steel in respect of the billets of acid Siemens Martin charcoal steel used in its manufacture.

SHAREHOLDERS OF JOSEPH RODGERS AND SONS, LTD., at special meetings at Sheffield on December 9 agreed to a reduction of the capital and to a working arrangement with John Round and Son.

THE CHRISTMAS JUVENILE LECTURES of the Royal Institution will be given by Professor A. O. Rankine on "The Round of the Waters," at the Institution, 21, Albermarle Street, London, W.1, at 3 p.m. on December 27, 29 and 31.

IN A LECTURE before a joint meeting of the Bristol section and Plastics Group of the Society of Chemical Industry at Bristol University on December 15, Mr. Norman Swindin spoke of the chance discovery of the use of uncured rubber as a substitute for lead in lining chemical plant.

THE SEASONAL DECLINE HAS CONTINUED in several industries, according to "The Ministry of Labour Gazette." Employment improved, however, in the cotton industry, in textile bleaching, dyeing and finishing, in most of the metal industries, and in the motor venicle and glass industries.

MR. THOMAS PEARSON CROSLAND, J.P., of Newhouse Hall, Huddersfield, a partner in George Crosland and Son, woollen manufacturers, Huddersfield, and a director of Read Holliday and Son, now merged with the British Dyestuffs Corporation, left £51,053 (net personalty £50,130).

THE REPORT AND ACCOUNTS of the British Sulphate of Ammonia Federation, Ltd., for the year ending June 30, are now available. It is stated that the past year was the thirty-fifth year of propaganda work undertaken successively by the Sulphate of Ammonia Committee, the Association, the Federation, Nitram, Ltd., and Imperial Chemical Industries, Ltd.,

AMONG ARTICLES OF INTEREST in the December issue of the "Harco Magazine," the journal of G. A. Harvey and Co., Ltd., is one with cabs for power excavators, which are manufactured by the firm, and another on a ventilating problem, where a system was designed for conveying dust, and chips thrown off by buffs, artificially.

SIR FREDERICK GOWLAND HOPKINS, president of the Royal Society, on December 17, at King's College, London, unveiled a memorial to Professor William Dobinson Halliburton, the great bio-chemist, in the physiology laboratory of which he was the founder. There was a large attendance of members of the Physiological Society of Great Britain. Mrs. Halliburton, widow of Professor Halliburton, was present.

THE HOME SECRETARY has made a welfare Order applying to all factories and workshops in which clay, shale, sand, lime or similar materials are made into bricks, tiles, or similar articles. This order comes into force on January 1, 1933, except that in certain cases the requirement as to the provision of a suitable messroom does not take effect until July 1, 1934, and the requirement as to the provision of facilities for washing does not take effect until January 1, 1934.

A PAPER ON THE WORK of the Scottish Coke Research Committee was given at Newcastle by Mr. William Davidson at a joint meeting of the Coke Oven Managers' Association, the Institute of Mining and Mechanical Engineers, and the Institute of British Foundrymen. Mr. Davidson has been in charge of the Scottish Coke Research Station for several years and was giving his first report on experiments into the blending of coals with special reference to Scottish coals.

THE SOCIETY OF DYERS AND COLOURISTS states that Professor W. H. Gardiner, formerly principal of the Technical College, Bradford, will relinquish, at the end of the year, his position as editor of its journal, which he has held for thirty-four years, and that Professor F. M. Rowe, Professor of Colour Chemistry at the University of Leeds and foreign editor of the journal, has been appointed in his place co-editor with Mr. Ellis Clayton, Chief Lecturer in Dyeing and Cellulose Chemistry at the Technical College, Bradford.

REPRESENTATIVES OF THE MASTER SPINNERS' FEDERATION, the Cotton Spinners' and Manufacturers' Association and the Allied Associations of Bleachers, Dyers, Printers and Finishers, held a meeting, with Mr. T. D. Barlow, President of the Manchester Chamber of Commerce, on December 19, to discuss foreign competition in the cotton trade. This conference follows the special general meeting of shippers held in Manchester on December 12, when a resolution was passed regarding competition by countries with depreciated currencies in British markets, especially Crown Colonies.

Obituary

THOMAS JOHN UREN, chemist at the works of Holman Bros., Ltd,. engineers and iron founders, at Cambourne, on December 17.

THOMAS HARLEY, manufacturing chemist, at Ashleigh, Isle Road, Perth, on December 15, aged 68.

Company News

W. and T. Avery, Ltd.—An interim dividend of 5 per cent., less tax at 4s. 6d., is payable on the ordinary shares on January 2.

Broken Hill South, Ltd.—A dividend at the rate of 1s. per share has been declared payable in Melbourne on February 10.

W. & H. M. Goulding, Ltd.—An interim dividend is announced of 3 per cent. on the ordinary shares, payable on December 31.

Amalgamated Metal Corporation, Ltd.—The usual half-yearly dividend on the 6 per cent. preference shares will be paid on January 2.

Cyprus and General Asbestos Co.—The accounts for the year ended June 30 last show a loss of £3,235. The annual meeting will be held in Cyprus on December 31.

Cape Asbestos Co.—A dividend at the rate of 5 per cent. per annum is announced, payable on the cumulative participating preference shares on January 2.

Low Temperature Carbonisation, Ltd.—The credit balance on trading account for the year ended October 31, amounts to £39,079 (against £25,129.)

Yorkshire Dyeware and Chemical Co.—An interim dividend of 2½ per cent., is announced on the £1 fully-paid ordinary shares, against 2½ per cent. on the 15s. fully-paid ordinary shares which was paid last year.

Joseph Nathan & Co., Ltd.—A preliminary report for the year ended September 30 last shows a profit, subject to audit, of £21,531, compared with £52,137 last year. The full report will be issued in March next, when the annual meeting will be held.

Imperial Smelting Corporation.—The dividend on the 6½ per cent. preference shares for the half-year ended December 31, is payable on January 2, less tax. The directors state that it is proposed in future to alter the dates for payment of such dividends from July 1 and January 1 to October 1 and April 1.

Turner & Newall, Ltd.—For the year to September 30 last the report states that there is a profit of £423,820, as compared with £530,037 in the previous year. The ordinary shares are to receive a final dividend of 2½ per cent., making 3¾ per cent. for the year, against 5 per cent. in the previous twelve months, and the carry-forward is raised from £34,840 to £52,766. The annual meeting will be held at York on January 12 at 12 noon.

British Benzol and Coal Distillation Co.—The trading results for the year to October 31 last show a loss of £5,393. After charging overhead expenses, bank interest, etc., and allowing £9,768 for depreciation, the loss for the year is £25,541. The total debit on profit and loss account is now £65,583.

Anglo-Continental Guano Works.—The net profit for the year ended June 30 last amounts to £46,179. After charging debenture interest, the directors propose to pay on December 31 one half-year's preference dividend to December 31, 1931, to set aside £3,375 for sinking fund for redemption of debenture stock, to place £5,000 to depreciation reserve fund, and to carry forward £36,928.

Amalgamated Zinc (de Bavay's).—The report for the half-year to June 30 states that the balance at credit appropriation account at the end of December last was £1,610, which, with £3,390 from equalisation reserve, made available £5,000, which was absorbed by payment of dividend 50. The income for the half-year was £6,899 (against £5,629 in previous half-year), consisting of £4,495 interest earned, etc., and £2,404 dividends received on shares in other companies. After deducting £572 for workers' compensation, £500 for taxation and usual administrative charges, the net profit is £4,484 which, with further £516 from equalisation reserve, leaves balance of £5,000 at credit of appropriation account. Since close of period, dividend 51 absorbing £5,000 has been paid. Liquid assets show surplus over liabilities of £217,341, not including £162,210 value of shares in other companies.

Egyptian Salt and Soda Co.—The report for the year ended August 31 last, states that the gross profits, including interest on investments, were £E66,092, from which is deducted administration expenses and interest account £E7,168, interest of debentures £E724, transfer to reserve for bad and doubtful debts £E3,000, depreciation £E6,000, leaving a net profit of £E49,200. To this is added the amount brought forward from last year £E193, making £E49,393 out of which it is proposed to distribute a dividend of 2s. per share, equal to 10 per cent., leaving to be carried forward £E858.

Power-Gas Corporation.—The accounts for the year ended September 30 last show a profit for the year of £14,752 (against £14,649) The directors have appropriated to reserve fund £2,000, leaving £12,752, to which is added the balance brought forward, making £22,141. The dividend at the rate of 4 per cent. per annum, less tax, takes £12,000, leaving to be carried forward £10,141. The report adds that the accounts of the subsidiary company, Ashmore, Benson, Pease and Co., Ltd., for the year to September 30, 1932, after charging debenture interest, show a profit, which has been taken into the accounts of the Power-Gas Corporation. The sum of £2,112 has been taken from that company's balance of profit brought forward.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

BASTIAN & ALLEN, LTD., London, W., electrical engineers. (M., 24/12/32.) Registered December 7, £5,000 (not ex.) debenture, to Candy Filter Co., Ltd., 14 Church Road, Hanwell; general charge. *——. April 2, 1932.

BRANDON OILS, LTD., Sheffield. (M., 24/12/32.) Registered December 6, £2,000 debenture, to Branch Nominees, Ltd., 15 Bishopsgate, E.C.; charged on land at Sheffield, also general charge.

CAULINUTE PRODUCTS, LTD., London, E.C., chemists, etc. (M., 24/12/32.) Registered December 12, £300 debentures; general charge.

CEMENT INDUSTRIES, LTD., London, S.W. (M., 24/12/32.) Registered December 13. £3,600 debentures, part of £70,000; general charge.

CHEMICAL & INSULATING CO., LTD., Darlington. (M., 24/12/32.) Registered December 7, £50,000 debentures; general charge. *Nil. July 11, 1932.

COWBURN (W. H.) & COWPAR, LTD., Manchester, chemical merchants. (M., 24/12/32.) Registered December 7, £30,000 debentures; general charge. *£15,000. October 7, 1932.

Satisfaction

CHESHIRE UNITED SALT CO., LTD., London, E.C. (M.S., 24/12/32.) Satisfaction registered December 13, £7,375 registered March 7, 1927 to February 6, 1928.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

ROBERTS, MR. W., 4 Dunster Gardens, Dyne Road, N.W., manufacturing chemist. (C.C., 24/12/32.) £19 8s. 6d. November 9.

London Gazette, &c.

Companies Winding Up Voluntarily

McALLISTER CHEMICAL CO., LTD. (C.W.U.V., 24/12/32.) By reason of its liabilities, December 12. Mr. John Henry Hardy, Albert Works, Forty Acre Lane, Canning Town, London, nominated liquidator. Creditors' debts or claims to Mr. J. H. Hardy, 7 Langley Drive, Wanstead, Essex, by January 16.

WRAYS DRUG CO., LTD. (C.W.U.V., 24/12/32.) By reason of its liabilities, December 8. Mr. Charles William Stanley Temple, of 9 and 10, Pancras Lane, Queen Street, London, E.C.4, appointed liquidator.

Bankruptcy Information

RUSHTON, HERBERT HENRY, Oakdene, Arkley, Herts, and carrying on business at 19 Basinghall Street, London, E.C., merchant and petroleum technologist. (R.O., 24/12/32.) Receiving Order, August 25, 1932. Creditor's petition. First meeting, January 3, 1933, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2. Public examination, March 14, 1933, 11 a.m. Bankruptcy Buildings, Carey Street, London, W.C.2.

Company Winding Up

RAYON MANUFACTURING CO. (1927), LTD. (C.W.U., 24/12/32.) Statutory meetings at Bankruptcy Buildings (Room 53), Carey Street, Lincoln's Inn, London, December 30; creditors, 2.30 p.m.; contributories, 3.15 p.m.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to December 30, 1932.

Ace Brand. 535,672. Class 3. Chemical substances prepared for use in medicine and pharmacy. Ayrton Saunders & Co., Ltd., 31 Hanover Street, Liverpool. October 13, 1932.

Rockite. 534,240. Class 1. Synthetic resin in liquid or powdered form, being a chemical substance for use in the manufacture of electrical insulators, lacquers, varnishes, adhesives and the like. Rockhard Resins, Ltd., 204 and 206 Great Portland Street, London, W.1. August 15, 1932.

Opposition to the Registration of the following trade marks can be lodged up to January 7, 1933.

Synthaprufe. 534,321. Class 1. Preservative dressings for wood, stonework, brickwork and metal. The Powell Duffryn Steam Coal Co., Ltd., 1 Great Tower Street, London, E.C.3. August 18, 1932.

Oestroform. 536,016. Class 3. Chemical substances prepared for use in medicine and pharmacy. The British Drug Houses, Ltd., 16 to 30 Graham Street, City Road, London, N.1. Ocober 25, 1932.

Opposition to the registration of the following trade marks can be lodged up to January 14, 1933.

"Zulu." User claimed from April 29, 1930. B532,533. Class 1. Enamels (in the nature of paint) and lacquers. F. Hulse and Co., Ltd., Woodlesford, near Leeds. June 10, 1932.

Embrodex. 536,203. Class 3. Chemical substances prepared for use in medicine and pharmacy. W. J. Bush and Co., 28 Ash Grove, Hackney, London, E.8. October 29, 1932.

Synobel. 535,757. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Nobel Chemical Finishes, Imperial Chemical House, Millbank, London, S.W.1. Octber 15, 1932. (By consent).

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Norway.—A firm established at Oslo are desirous of representing United Kingdom manufacturers of horn glue. (Ref. No. 857.)

Sweden.—A commission agent in Stockholm is desirous to represent United Kingdom producers of lactic acid. (Ref. No. 860.)

Canada.—A firm of manufacturers' agents at Winnipeg desire to obtain United Kingdom agencies in drugs on a commission or consignment basis, in the three Prairie Provinces. (Ref. No. 837.)

Morocco (International Zone).—A commission agent established at Tangier desires to obtain the representation of United Kingdom manufacturers or exporters of soya bean oil. (Ref. No. 863.)

Egypt.—The Egyptian Ministry of War and Marine is calling for tenders, to be presented in Cairo by February 25, 1933, for the supply of approximately 67 metric tons of coconut oil. (Ref. B.X. 7468.)

Belgium.—An agent established at Brussels is desirous of undertaking the "making up" of pharmaceutical specialists of United Kingdom manufactures. Correspondence may be in English. (Ref. No. 848.)

Egypt.—The Commercial Secretary to the Residency, Egypt, reports that the Egyptian Ministry of Public Works is calling for tenders, to be presented in Cairo by January 16, 1932, for the supply of a pumping set and air blower, electrically driven. (Ref. G.X. 12125.)

British India.—A well-established Parsee firm of importers and manufacturers' agents in Bombay are desirous of securing the sole representation, on a purchasing basis, of manufacturers of oil expellers, oil mills, oil presses, etc., rice hullers, rice hullers and polishers, sugar centrifugals, cane crushers, etc. for Bombay, Madras, the Punjab and the United Provinces. (Ref. No. 834.)

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